

Aristotle's Ever-turning World in *Physics* 8: Analysis and Commentary

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Aristotle's Ever-turning World in *Physics* 8: Analysis and Commentary

By

Dougal Blyth



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Library of Congress Cataloging-in-Publication Data

Blyth, Dougal.

Aristotle's ever-turning world in Physics 8 : analysis and commentary / by Dougal Blyth.

pages cm. – (Philosophia antiqua, ISSN 0079-1687 ; 141)

Includes bibliographical references and index.

ISBN 978-90-04-30237-2 (hardback : alk. paper) – ISBN 978-90-04-30238-9 (e-book)

1. Aristotle. Physics. Book 8. 2. Science, Ancient. 3. Physics—Early works to 1800. 4. Motion—Early works to 1800. I. Title.

Q151.A73B59 2015

530—dc23

2015027430

This publication has been typeset in the multilingual “Brill” typeface. With over 5,100 characters covering Latin, IPA, Greek, and Cyrillic, this typeface is especially suitable for use in the humanities. For more information, please see www.brill.com/brill-typeface.

ISSN 0079-1687

ISBN 978-90-04-30237-2 (hardback)

ISBN 978-90-04-30238-9 (e-book)

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This book is printed on acid-free paper.

In memoriam

CAB, WKL, CWIP, REA, OKH



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Acknowledgements

This book could not have been completed without the long-term self-sacrificing love and practical support of my wife Suella, in the midst of many other important responsibilities and concerns of her own. No words or actions could ever be enough to convey fully my gratitude to her. I am also most grateful to the rest of my family, my friends (near and far), colleagues and students (former and present) for their encouragement and forbearance over the many years of this project.

Thanks are also due to convenors of research seminars in Classics and Ancient History at the University of Auckland, who during this time have allowed me several opportunities to discuss a variety of texts and topics from Aristotle's *Physics*, particularly Bk 8, and also to colleagues and students attending, for their enlivening and useful questions and comments; and similarly to colleagues in Philosophy for an invitation several years ago to discuss some related methodological issues at a workshop held to coincide with a visit to the University of Auckland by Geoffrey Lloyd. I also acknowledge gratefully the provision of several periods of research leave by the University of Auckland during which major parts of this work were done.

This is not the place for a wider recognition of relevant intellectual influences and debts, particularly since none of the most potent is still among the living. I do want to thank Dory Scaltsas for proposing the ancestor of this project, and I am only sorry it could not see the light in the form in which he envisaged it. I am also grateful to the editorial committee at Brill for their positive response to the draft of this book, and for the helpful suggestions of their reader, and to my recent student Aidan Nathan for indexing it.

General Introduction

The Purposes and Approach of This Volume

The aim of the following work is to make Aristotle's meaning and method in Book 8 of his *Physics* more accessible, and to represent it more accurately. The treatment of Aristotle's text is organised passage-by-passage, normally in the order *Translation*, *Analysis* of the reasoning, *Commentary* on alternative construals and larger issues raised in the scholarship, and then *Notes* on particular points. This division is in some respects artificial and sometimes the same points need to be discussed in three different places, but articulation of the commentary into these shorter units is intended to facilitate both reading and cross-referencing. Readers should be aware that occasionally, where warranted, the *Notes* on some points are quite extended and should be consulted in relation to the *Analysis* and main *Commentary* on a passage. By contrast footnotes have been kept to a minimum and are almost exclusively used to alleviate obscurity in the translation. The text here translated is that of Ross (1936) unless otherwise indicated.

The focus of the *Analyses*, and overall, is on the details, structure, and techniques of Aristotle's reasoning. While his natural philosophy does make appeal to evidence, either in observable nature, common understanding, or even the facts of linguistic usage, the dominant feature of his method is argument and explanation by reasons, either from his own previously established doctrines on a topic or from common assumptions, which produces two corresponding, and more or less distinct types of argument, physical and dialectical (the latter, for a given conclusion, not infrequently following the former; on the distinction see Ch. 8, 264a7–9 and *Commentary*, pp. 263–264). Evidence of Aristotle's reasoning extends from the ubiquitous structuring of sentences in accordance with logical relationships (themselves indicated by the characteristic use of common Greek syndetic particles) to architectonic patterns of thesis and proof, problem and solution, question and answer that operate across the boundaries of what we call chapters and unify the Book as a single project (μέθοδος, *methodos*).

There has been ongoing interest in recent decades in Aristotle's scientific method: see e.g. the articles of Robert Bolton and recently Leunissen (2010) with bibliography. Owing to Aristotle's own advances in logic in the *Prior* and *Posterior Analytics*, including his theory of the syllogism and account of demonstrative scientific knowledge, one particular problem scholars have faced is the manifest difference between the theory and his own practice in his

scientific works. In antiquity this has often led his commentators, prominently Simplicius, to reformulate Aristotle's arguments, in the *Physics* as elsewhere, in syllogistic form. In this work I follow a slightly different, but, I believe, more illuminating procedure in analysing and formulating Aristotle's reasoning in *Physics* Bk 8.

The most insightful empirical study I know of Aristotle's actual practice in argumentation is Netz (2001–2002), demonstrating, firstly, that Aristotle's texts are constituted out of paragraphs, and secondly that Aristotle more frequently justifies or explains (i.e. gives a reason after a fact) than he infers (or draws a conclusion), although he does do both. He might reason in a passage (taken here at random) somewhat as follows: (1) Now (δὴ) A; for (γάρ) B. (2) Now (δὴ) C; for (γάρ) D, so that (ὥστε) E. (3) Furthermore (ἔτι) F; and/but (δέ) G, and/but (δέ) H, and/but (δέ) I. (4) And/But (δέ) J, for instance (οἷον) K. (5) As a result (ὥστε) L. (6) And/but similarly (ὁμοίως δέ) M. (7) Thus (ἄρα) on the one hand (μὲν) N, but on the other (δέ) O. (*Ph.* 8.5, 257a33–b13)

It is evident that Aristotle justifies in sentences (1) and (2), but infers also in sentence (2) as well as in (5) and (7). Two other things are immediately evident: that it is necessary to consider the content of the sentences in order to see from what premisses the conclusions follow, and what is meant to explain what; and moreover that we are guided by the punctuation in this respect also, while of course that is partly a matter of manuscript tradition (although with no basis in any known practice in Aristotle's day), and partly a matter of editorial decision. Thus Aristotle's reasoning must be reconstructed primarily by appeal to his use of Greek, but also on the grounds of what might be plausible as intended structures of reasoning on the basis of the content of sentences and their component parts, and the grammatical and logical possibilities and likelihoods for their relations.

There are three particular further common problems that are exemplified in this sample passage, firstly, how sentences or groups of sentences reasoning partly in both directions are to be construed logically: see for instance sentence (2) above: does C follow from E and E from D, or does E follow from C, and C from D? Problems like this are relatively common in *Physics* 8. Secondly, for instance in (5), what does L follow from, all of F to J, or also from A in (1) and something in (2)? Or are the latter independent results? (In fact ἔτι normally introduces a new argument.) And similarly, just what supports N and O in (7), and moreover does each of the latter have *separate* support in what precedes? Thirdly there is the formal ambiguity between what the scholastics called a *ratio essendi* and a *ratio cognoscendi*, roughly between a cause and a justification: this does not affect the logic of Aristotle's sentences, but it does affect their interpretation, particularly when he reasons 'backwards' as he more

commonly does overall: in a given case, are we given an explanation of a fact or a justification for a claim?

These are the kinds of problems also faced by contributors to Project Archelogs, an initiative to produce online hypertextual analyses of the argumentation of the works of Plato and Aristotle (www.archelogs.com). The present commentary on *Physics* Bk 8, although comprehensively revised, is derived originally from a contribution to that now stalled project, but retains from it the insight shared with Netz, and also Lang (1992 and 1998), that Aristotle's mode of reasoning is more usually and naturally a matter of explanation and justification than inference to conclusions (although the latter mode does occur, for instance significantly in the proof of the incorporeality of the first mover of the cosmos, in *Ph.* 8.10).

Printed-page style presentation has certain advantages over the hypertext format of Archelogs, in that it allows, firstly, for a more natural discursive approach to problems and descriptions, secondly, for a focus on the individual passages and paragraph structure of Aristotle's text (for which a translation has accordingly here been supplied), and, thirdly, for more extensive discussion of scholarship and interpretive problems than Archelogs permits. As a result the presentation of the analysis of Aristotle's reasoning has here been extensively altered from the Archelogs model, with, firstly, a reformatting and thoroughly revised treatment of individual arguments, and a new kind of reference system for individual claims and their logical relations indexed to Aristotle's text through the translation (while retaining the more illuminating 'backwards' direction of explanatory and justificatory structure from Aristotle's own text captured in the Archelogs method), and, secondly, the architectonic features of Aristotle's scientific method have been presented discursively in introductions to chapters, parts of chapters and notes on sections of text, which allows for more expansive explanation and discussion than does a quasi-graphic hypertextual display.

In order to illuminate Aristotle's thinking, a work like this must also draw together the advances of previous commentaries, adjudicating disagreements, correcting errors where necessary, and filling in their occasional, albeit infrequent, omissions, as is my procedure here in the *Commentary* sections and *Notes*. Fundamental, and most useful for the reader of Greek, is Ross (1936), while Simplicius' late antique Neoplatonist commentary is most detailed and often very useful (notwithstanding his clear bias towards reconciling Aristotle with Plato). From earlier antiquity, Themistius' much briefer paraphrase is also of some use, but much more important is the surviving and recovered evidence of the lost commentary on the *Physics* by the non-Platonist Alexander of Aphrodisias from the early third century AD. Simplicius' regular citations

are now extensively supplemented by the hundreds of recovered fragments of Alexander (for *Physics* Bks 4–8) in Rashed (2011), from which my final revisions have benefited enormously.

Also deeply influenced by Alexander, the Greek fragments of Philoponus' commentary, contemporary with Simplicius, are of some help, as are occasionally authors in the Arabic tradition, who had Arabic translations of Philoponus and in some cases apparently of Alexander's own commentary.¹ Here I have relied mainly on Lettinck (1994), while making occasional use of Ibn Rushd's (Averroes') *Long Commentary* in the early printed Latin translation (1562).² Owing to the problems this work presents, I have not analysed it systematically;³ thus I take Thomas Aquinas, influenced by Ibn Rushd, as the most useful representative of medieval commentary on *Ph.*, and I have referred to him regularly.

Of modern work treating the whole *Physics* or Bk 8, I have not infrequently found the Loeb translation by Wicksteed, revised by Cornford, with separate notes by each, published (1934) just before Ross, very illuminating (although the translation is often mere paraphrase). I have also consulted Apostle's commentary (revised ed. 1980), which frequently follows Aquinas, and is sometimes very interesting on more exact scientific matters. Wagner's (1967/1994) and Zekl's (1988) German translations each with extensive notes have both been useful, either on the meaning of the text or to elucidate Aristotle's thought, although I have not always accepted their explanations. Finally the Clarendon philosophical commentary by Graham (1999) has been some help, particularly on matters to do with the Presocratics, and for comparison and contrast with modern physical ideas, and has always provoked my awareness of the need for accurate analysis of arguments.

The Aim and Achievement of *Physics* Bk 8

In the collection of books we know as Aristotle's *Physics* he investigates nature (φύσις, *phusis*) and movement (κίνησις, *kinēsis*). He uses the latter term to

-
- 1 See Giannakis (pp. 158–159), who also shows that there are no fragments of Alexander in the Leiden codex containing an Arabic translation and commentary on the *Physics*.
 - 2 Ibn Rushd seems to have used Philoponus, and this may be the source of his knowledge of Alexander in many places in the *Physics*; he probably reports (*LC* 1B7–11, E7–11) only having part of Alexander on Bk 8, and that not in Alexander's own words. See Harvey (p. 93 n. 21), and cf. Glasner (pp. 53–54).
 - 3 See Glasner (ch. 4, esp. pp. 32–40, 42, 45, 47–48; cf. pp. 92 and 101 with n. 214) on differences from the Hebrew version and the problem of revisions and inconsistent insertions; a modern edition (if possible) is still awaited.

include all kinds of change, not just locomotion (φορά, *phora*; κίνησις κατὰ τόπον, *kinēsis kata topon*), in some places including, and in others more strictly excluding, generation and destruction (coming to be and ceasing to be; see *Ph.* 5.1–2; cf. 3.1). The sense of the term *kinēsis* is usually inclusive in Bk 8, which has a more explicitly cosmological orientation than earlier books; cf. Solmsen (1960, p. 223), Zekl (p. 282 n. 1). These books as a whole can be said to be on physics, but not in the sense of modern mathematical physics. Aristotle's method is primarily one of dialectical reflection on questions beginning from generally recognised phenomena and prominent opinion, and systematic argumentative application of the principles that result. Thus it is probably best overall to call the subject natural philosophy, although below (see esp. on Ch. 3, 253a32–b6 and 254a23–30, pp. 58–63) it is useful to distinguish between those aspects of Aristotle's procedure that directly pursue a knowledge of nature ('physics') and those where he reflects upon and justifies his conception of its principles and legitimacy ('philosophy of nature').

Historically, *Ph.* 8 has been the subject of intense philosophical and scientific interest, and divergent interpretation. It has been seen not only as the culmination of the study of nature in the *Physics*, but even as natural theology. For instance Aquinas (8.965) states that its overall aim is the inquiry into the natures of the first mover of all nature, of the first movement, and of the first moved thing, on the assumption that the former has been demonstrated to exist in Bk 7. Accordingly he sees the initial investigation into the everlastingness of movement (*Ph.* 8.1–3) merely as a preliminary. This raises several connected but distinct questions: first, the relation between the two books (a topic for another study), second, the precise achievement of Bk 8 regarding the first mover, and third, the overall aim of the book.

Most other commentators have also understood *Ph.* 8 in terms of its treatment of the first mover. The Neoplatonist Simplicius (1117.9–15), who considers it independent of Bk 7, tells us Bk 8's greatest achievement is the linking of natural to 'first' philosophy (theology), the demonstration that nature depends upon a supernatural cause, and that Aristotle's aim here is to show that the first mover is an everlastingly motionless substance. In a similar vein Cornford too (1934, p. 264) begins his account of *Ph.* 8 with a reference to the prime mover, and cf. also Verbeke (p. 136) and Solmsen (1961, p. 270). The most recent English-speaking commentator on Bk 8, Graham (1999), treats *Ph.* 8 as providing an argument that is meant as self-sufficient, for the existence and nature of the first cause of movement. He clearly also thinks of this as the ultimate aim of the book: "to identify this source of motion is to solve the ultimate riddle of science" (1999, p. ix). Graham says next to nothing at all about *Ph.* 7, in accordance with the modern consensus (*pace* Wardy), regarding Bk 8's com-

plete independence from the former (cf. Graham, 1999, pp. xiii–iv, following Ross).

Aquinas' view implicitly raises another question too. Aristotle does say in his introduction to *Ph.* 8,

For it is not only advantageous to see the truth with regard to the study of nature, but also with regard to the project (μέθοδος, *methodos*) concerning the first principle.

251a5–8

Yet it makes more sense to think of *Metaph.* 12 as the work with the primary aim of an investigation of the nature of the first mover. No doubt *Ph.* 8 does draw significant conclusions about the physical role of this cause, but arguably these are (at least in the context in which they occur) subservient to another primary aim: the explanation of nature as such. This book belongs to the *Physics*, Aristotle's 'books on nature' (Bks 1–4) and 'on movement' (Bks 5–6, 8, and at some remove, Bk 7), which present his philosophy of nature, after all, not his 'first philosophy', where the nature of the first mover as an immaterial substance is of thematic importance. (For the distinction of subjects, see, e.g., *Metaph.* 6.1, esp. 1026a18–23.) Moreover *Metaph.* 12 (along with *De caelo* 1–2) also has more to say on the nature of the first thing moved, the sphere of the fixed stars, and about the other celestial spheres and their specific movers, than *Ph.* 8 has.

What, then, is the relation between the accounts of the prime mover here and in *Metaph.* 12? Graham (1999, p. xvi) calls *Ph.* 8 "a bridge between physics, cosmology, metaphysics and theology". Yes, *Metaph.* 12 draws on conclusions from the present book (see esp. 12.6–7, 1071b5–11, 1072a21–24, b8–10, 1073a5–12), as from many other books of both the *Physics* and *Metaphysics*. Nevertheless, notwithstanding Aristotle's remark quoted above, it might well be factually mistaken, not to say anachronistic, to conceive of him as aiming across many works at an overall system. Perhaps we should rather conceive of these different works as a series of disciplinarily independent, although generally consistent, distinct studies (i.e., *methodoi*), with methodologies focused on problem solving and topical explanation, rather than architectonic system building. For this conception of Aristotle's scientific texts see Lang (1992, e.g., pp. 5–12, 58–68), and Lang (1998, pp. 11–12, 19–26 and cf. pp. 211–212, 253 on Bk 8); cf. also Netz (pp. 224–225). A contrasting systematic view of the *Physics* is proposed briefly by Zekl (pp. xxxvi–vii), but I think he makes too much of the promise at *Ph.* 3.1, 201a25–27 to account elsewhere for unmoved movers; this topic would be bound to come up in some appropriate subsequent study (viz, Bk 8).

Ross (p. 85), while allowing that the argument of Bk 8 is essentially from everlasting movement to the existence of an unmoved mover as its first cause, asserts that the object of the book is “to account for the presence of movement in the world, and for its having the characteristics it has”. Ross’s various statements imply that he understands Aristotle’s view of the overall task of natural philosophy to be to explain the facts of movement, or change (cf. pp. 21, 94); the demonstration of the existence and character of the prime mover, insofar as that is properly part of the philosophy of nature as the subject matter of the *Physics*, is subservient to this further overall aim (cf. similarly Waterlow, 1982, pp. 248–249). This conception is more helpful, I believe, than the search for an interdisciplinary system.

It is not merely the overall prominence of the first mover in *Ph.* 8 that leads many to view that as the focus. At the beginning of Ch. 3, having argued for the everlastingness of movement as a whole and seen off three objections in the first two chapters, Aristotle starts out again by distinguishing all possible dispositions of movement and rest in the cosmos, and immediately dismissing all except two. Of these he champions the position that there are some everlastingly motionless things, some everlastingly in movement, and others that both move and rest, against the possibility that there is only the latter sort of beings. This sets the agenda for subsequent chapters. Accordingly even the levelheaded ancient commentator Alexander of Aphrodisias stated, “the aim is to find something being forever continuously moved by something everlastingly motionless” (ap. Simplicius 1193.33–35; cf. fr. 788 Rashed).

Yet the identification of a motionless first mover and the everlasting celestial rotation it causes is not an independent project: the analysis of possible dispositions of the cosmos in Ch. 3 takes its start from the need to solve three problems thrown up in the course of Aristotle’s previous rejection of three imagined objections to his own claim that movement is everlasting (253a22–24, a30–32). These are the problems, how there can be everlasting movement, given the boundaries delimiting all those kinds he has previously discussed (252b35–253a1); why some beings are sometimes in movement and at other times at rest (253a5–7); and how it is that animals seem to move themselves when in fact they are subject to prior causes (253a20–21). The metaphysically significant discoveries of later chapters are subservient to the aim of solving these particular problems. In other words, given that movement as a whole must be everlasting, Aristotle’s task in Bk 8 is to explain how that can be so, and in particular how that accounts for the occurrence of limited and even apparently spontaneous movements, the movements of terrestrial nature and animals.

I should note here that I draw no general support for this view from the treatment of *Ph.* 8 by Seeck, despite its interest. Seeck (pp. 131–132) notes

that four of the six proofs of the unmoved mover (by his count) belong to passages whose rightful place at their traditional locations in the text has been questioned by other prominent scholars, among which Ch. 5, 256b13–27 is questioned by Cornford and Ch. 10, 266b27–267b17 by Solmsen. These Seeck himself regards as the two longest among many later insertions, while, he argues, one of the remaining two proofs is merely a repetition of the other (for details see the *Notes* to Chs. 5–6); thus Seeck concludes that the prime mover was not originally such an important part of the original text of *Ph.* 8. His position is vitiated by a failure to distinguish clearly and systematically between arguments that any first mover must be unmoved (cf. Ch. 5), and arguments that there is a first, everlasting, unmoved mover of the cosmos (Ch. 6, and Ch. 10, 267a21–b17). Solmsen (1967) reviews and criticises Seeck in detail, yet the latter's analysis (pp. 133–135) of passages in which Aristotle himself comments on the aim of the work (251a5–8, 253a28–32, 266a6–9) does independently support the view that the doctrine of an immaterial cosmic first cause is not the overriding aim of *Ph.* 8.

The subordinate status of interest in the prime mover in the text makes sense in terms of the aims of natural philosophy, i.e., the explanation of nature and so of all movement in the cosmos, by contrast with the aims of theology. It also helps explain something that remains a problem for those who think the focus is primarily on the prime mover. Following the demonstration of the existence of the latter, Aristotle announces a fresh start in Ch. 7, which begins the account of the single everlasting movement. If the identification of the prime mover is not, after all, the overall goal of the book, the turn to what it directly moves is not unexpected. (It is in fact foreshadowed in Ch. 6, 259b32–260a19.) The new start represents a different approach, which will explain further the everlasting movement already identified. Again, yes, Aristotle returns to the prime mover in Ch. 10, but only really in a negative way, to exclude any further consideration of this cause from the *Physics*, since as a being of no magnitude the prime mover is not part of the natural world.

The *methodos*, or project, of *Ph.* 8 is by now complete: Aristotle has shown that movement is everlasting, that the problems this claim raises about its boundaries, range and causes, including the case of apparent animal self-movement, can be solved, and in particular that the solution involves the demonstration that there is both a single everlasting and motionless cause, and as a result a single everlasting body in motion, from which he can derive the intermittent movements of terrestrial nature. Moreover by demonstrating that the primary and only continuous movement is the locomotion of a circle, and that the prime mover acts on its periphery, he can identify the everlastingly moved first body as the diurnally rotating sphere of the stars.

That the book ends with the twin doctrines of the everlasting heavens and of the incorporeality of the prime mover should perhaps not induce us to interpret either of these results individually, or even both together, as the superordinate goal of the project. Their significance is explanatory, and hence belongs essentially together with what went before, and in particular with the opening of the book: the establishment and explanation of the everlastingness of movement. It is because it explains *this* that the *methodos* undertaken here belongs essentially to the philosophy of nature, and is accordingly restricted to the subject matter of nature and its causes (*qua* causes), and the resolution of precisely those problems that this particular *methodos* raises.

What Aristotle has achieved thereby is, firstly, to establish in his terms the overall intelligibility of bodily nature and movement (cf. esp. Chs. 3 and 6, and, disparagingly, Graham, 1999, p. xvi), contradicting not only the Eleatics but also some notorious remarks in certain Platonic dialogues and the scepticism of sophists and even atomists. Secondly, he has given an account of nature whose concepts and procedures, he demonstrates in other works, can be applied in other *methodoi* to explain perhaps every particular part of nature (according to the principles of its own genus). Thirdly, he has (at least to his own satisfaction) refuted every single predecessor he has in the philosophy of nature, and produced for the future a much more rigorous conception of how in practice to go about this discipline than anyone before him had imagined possible.

Modern Philosophical Interest in *Physics* Bk 8

There is not room here for a thorough thematic discussion of all, or even the most important, topics of modern philosophical interest in *Physics* 8. That would require a separate monograph of a different kind, and in any case would replicate the details of the engagement with scholarly views here in the *Commentary* and *Notes* following the *Analyses* of individual passages. Nevertheless this is the place for some further orienting generalisations about Bk 8, and a brief introduction to matters of particular philosophical significance in the text, and some indications of where to find them discussed below. This includes both topics disputed within recent scholarship, and regrettably some in which I have been unable to agree with the *status quo*.

Physics 8 has been discussed in some detail in several important monographs in the last half-century or so, beginning with Solmsen's detailed study (1960) of the works on natural philosophy, and Wieland (1992, 1st ed. 1962). One basic theme of Solmsen, Aristotle's regular aim to correct or build on Plato, is extremely important for understanding *Physics* 8. He proposes that Aristo-

tle's principle that nature is an internal source of movement in natural beings (e.g., *Ph.* 2.1, 192b20–23), and his conception of a cause of movement, are both derived, but not coherently, from the Platonic position that soul, as what moves itself, is the first cause of movement; this incoherence would then precipitate the replacement of nature by an external mover as the cause of elemental movement in *Ph.* 8.4, and the analysis of a self-mover into a moved, and, separately, a mover part in 8.5. Wieland and some later scholars reject the claim that there is any incoherence between Bk 8 and the account of nature in Bk 2 (see further the *Introduction* to Ch. 4, esp. p. 77).

Perhaps more important for understanding Aristotle's account of nature and movement overall, and in Bk 8 in particular, is his ubiquitous distinction between potential (or potency) and actuality (or activity), first introduced in *Ph.* 1.8, 191b27–29, as an alternative to the principles subject, privation and form, to explain the possibility and nature of change. Aristotle defines movement as “the actuality of a potential, as such” (*Ph.* 3.1, 201a9–11; for interpretation see the *Note* on Ch. 5, 257b7, p. 137). This implies that movement intrinsically requires a cause external to the moved body itself, as the source of the actuality constitutive of movement (*Ph.* 3.3, 202a13–17; cf. b5–10 and *Metaph.* 9.8, 1049b23–27), and demonstrates that, conceptually at least, from the ground up Aristotle's understanding of movement, while undoubtedly a response to Plato, is based on quite different principles.

In *Metaph.* Bk 9, after distinguishing in 9.1–2 the potency (potential) to cause movement in something else, from that to undergo it as a result of something else, Aristotle comments (while arguing that activity is prior to potential) that nature belongs to the same genus as potency or potential, since it causes movement, but in itself, not something else (9.8, 1049b8–10). The immediate implication is thus that a nature is here understood as a complex whole (e.g. a plant or animal), requiring distinct parts with corresponding causal and passive potentials, something we can also apply to the interpretation of the definition of nature in *Ph.* 2.1, at least for organic living beings.

This then explains why simple elemental bodies (notwithstanding their natural potential to move to their natural places) require a different explanation in *Ph.* 8.4, as subject to an external mover. It also corresponds with the basis of Aristotle's distinction of mover and moved parts of a self-mover in his most ‘physical’ argument at 8.5, 257b6–12, that (a) movement leads from a potential for, to the actuality of, some defining form in what is moved, but (b) the mover must already actually possess that form (for example the heat with which it heats something). Undoubtedly Aristotle has difficulty extending this model of movement, derived from generation and qualitative alteration, to locomotion (for which see discussion of Waterlow in the *Introduction* to Ch. 6, pp. 161–162).

The distinction between potentiality and actuality is repeatedly applied in *Ph.* 8, in a variety of contexts, confirming its role as a core component of Aristotle's physical theory. In addition to the explanation of natural elemental locomotion (Ch. 4, 255a18–b24, pp. 90–97) and the distinction of mover and moved in a self-mover in Ch. 5, see there also 256b34–257a27 (pp. 124–130), among the arguments that not all movers can be externally moved. More significantly this distinction is also the basis of the first argument in Ch. 1 that movement is everlasting (251a9–b10, 251b28–252a5, see pp. 23–32), fundamental to the whole project of Bk 8, and to the main argument of Ch. 8 that reversing rectilinear locomotion is not continuous, preliminary to the demonstration that the first movement is rotation (see 262a12–263a3, pp. 234–250). This application then leads to the corollary giving Aristotle's final solution to Zeno's problem of traversing an infinitely divisible continuum (263a4–b9, pp. 250–255).

Aristotle's argument here is that a body moving continuously does not occupy any of the points it traverses, since those points (of space or time) only potentially exist, unless the continuum is cut at any point (either in thought or reality), in which case the body must stop (or be conceived as stopping) at that, accordingly actual, point. This corresponds with Aristotle's doctrine (*Ph.* 3.4–8) that no infinity, e.g. of points in a continuum, is actual, in contrast to the hypothesis of modern mathematics. The basis of Aristotle's conception here is that to be at a point is to have arrived there, in other words, that the point must be the end of movement toward it. Given his conception of movement as goal-directed, at that endpoint the moved body must actually possess a condition for which movement by contrast is merely the activated potential. Thus to be at the endpoint is to have finished a movement and so rest; the real problem, nevertheless is whether that 'rest' must take time. Aristotle argues rest is incompatible with continuing movement, but he faces the problem that on his own doctrine there is no first moment of movement (*Ph.* 6.5, 236a13–b17), seeming to imply the possibility that the rest is indistinguishable from a recurring movement, or only infinitesimally short, although Aristotle has reasons to deny that: see further discussion of Sorabji, Waterlow, Charlton and Drozdek (*Commentary* on 262b22–263a3, pp. 247–250). On time in Aristotle see also Coope (2005) more generally, with discussion of *Ph.* 8.8.

Aristotle's teleological conception of movement also leads to the question how endless rotation then counts as a movement, rather than a complete actuality not in need of an unmoved mover, on which see discussion of Waterlow and Bodnár (*Introduction* to Ch. 6, pp. 161–162). Again, the concept of a causal potency is applied slightly differently in Ch. 10 in the argument that a limited magnitude does not have infinite potency, required to cause the first moved body's everlasting movement. Earlier commentators grappled with this theo-

logically, since if the prime mover does have infinite power, there would seem to be an actual infinite, according to Aristotle; but see further the *Introduction* to Ch. 10 (pp. 305–306). Moreover Aristotle's rejection of an actual infinite indicates the need for care in interpreting the use of proportions in the arguments that a limited magnitude cannot act for an unlimited time (266a10–24) or possess infinite power (266a24–b27); see pp. 309–333.

A distinct physical topic, central to Aristotle's argument for a single first movement and first mover, is that of the individuation of movements, and their one-to-one correlation with distinct movers. See here the *Commentary* on Ch. 6, 259a13–20 and especially the *Note* on a18–19 (p. 175); on Ch. 8, particularly 261b33–262a12 (pp. 230–233), 264a9–21 (pp. 264–267) and 264b6–9 (pp. 272–274); and on Ch. 10, 267a21–b3 (pp. 343–345).

Since their appearance, Nussbaum's translation, commentary and essays on *De motu animalium* (1978) and contemporaneously Furley's famous article "Self-Movers" (1978, reprinted elsewhere) have had a big influence on the interpretation of Aristotle's account of self-movement, a topic inherited from Plato and discussed in detail in several places in 8.2 and 8.4–6 and almost throughout 8.5; in later work influenced by these contributions, as also independently in Waterlow (1982), there is clearly a swing towards Simplicius' positive view of self-movement in Aristotle, and away from the scholastic doctrine, prominent in Aquinas, that denies it plays a part in Aristotle's explanation of animal movement. In some modern work (see, e.g., contributions to Gill and Lennox, eds., *Self-Motion from Aristotle to Newton*, 1994) this neo-Simplician endorsement of self-movement extends to the interpretation of Aristotle's cosmology and the movement of the spheres he posits to carry the stars and planets around the central earth. On the basis of the text of *Ph.* 8 I reject this perhaps now dominant view, and find some support in Sorabji's three indispensable books (1980, 1983 and 1988) on the history of Aristotelian and related physical concepts and theories in antiquity. I have discussed this in detail elsewhere, but see here especially the *Commentary* on Ch. 6, 259b1–16 (pp. 181–183), and on 259b16–22 & b28–31 (pp. 186–188); also on Ch. 4, 255a5–18 (esp. p. 90), the *Introduction* to Ch. 5 (pp. 104–105) and the *Note on Ch. 5*, 256a13–b24 & 256b27–258b9 (pp. 108–111), and cf. Blyth (2015).

Aristotle's arguments are often strong, at least given their assumptions, but sometimes seem clearly not so. Examples of the latter, of particular philosophical interest, include from Ch. 1, (i) the argument from time for the everlastingness of the cosmos (251b10–28; see the *Note* on b20, pp. 35–36), which fails if time as such, and any 'now' cutting it, belongs only to an elapse since a non-temporal beginning (e.g. the 'big bang'), and equivalently, before an ultimate end to the cosmos; and (ii), the application of the potentiality/actuality dis-

tion to argue against an end (251b28–252a5; see the end of the *Commentary*, p. 32), since Aristotle does not exclude the possibility of a final situation where potentials to destroy and be destroyed don't correspond, and so movement ceases.

In Ch. 8 one dialectical argument for the non-continuity of reversing movements (264b1–6) seems to require the supplied premiss that something does cease to be (e.g.) completely white (and so has become not completely white) as soon as it *is becoming* non-white (see the *Note*, pp. 271–272). The argument is a *reductio ad absurdum*, hypothesising and refuting the claim that reversing gradual change between opposite colours is continuous. Nevertheless this premiss is not the target, but merely a means to establishing the absurdity, if such change is continuous, that the times when something has become completely white, and first not completely white, are the same (264b5–6). Consequently Aristotle's argument is undermined if the premiss is false; nevertheless it contradicts his own doctrine that there is no first moment of becoming (e.g.) non-white (*Ph.* 6.5, 236a13–27). Perhaps rather than a failure, this is evidence of Aristotle's non-doctrinal approach in those arguments he introduces here as dialectical, as opposed to physical, adopting whatever premisses his opponent might accept.

A further weakness in Aristotle's achievement here, of a quite different order and ultimately great historical significance, is his explanation of things thrown (Ch. 10, 266b27–267a20) on which see especially the *Introduction* to Ch. 10 (p. 306) and the concluding paragraphs of the *Commentary* on 267a2–20 (pp. 337–340), with further references.

I conclude with notice of some passages and problems where I have been unable to follow the scholarly consensus in my efforts to make sense of the text or Aristotle's reasoning. I think I have shown here and elsewhere that Aristotle did not conceive of the heavenly spheres as self-moving, each containing a quasi-animal soul (see passages and references above on this topic). This follows partly from the analysis of Ch. 5, showing that Aristotle initially gives a separate argument establishing what a first mover is (256a4–13), then argues at length that a first mover must be either unmoved or a self-mover (256a13–b13, 256b27–257a31) before arguing that a self-mover in any case contains an unmoved mover (257a31–258b4). The implication here is that not all causal chains (and in particular those that lead back to the heavens) need do so by way of self-movers, contrary to many scholars. On this, and the rest of my case, see the *Introduction* to Ch. 5 (pp. 104–105), *Commentary* on 256a4–13 (pp. 106–107), the *Note on Ch. 5*, 256a13–b24 & 256b27–258b9 (pp. 108–111), and the *Extended Introductory Note* on 256a13–21 (pp. 112–113) and *Commentary* (pp. 113–115), and similarly for the following arguments to the same conclusion.

The analysis given of the structure of the third argument (as I find it) in Ch. 6 for an everlasting unmoved mover of the first everlasting movement (259a20–260a19) differs in various ways at various points from all previous commentators (see the *Note on Ch. 6*, 259a29–b31, pp. 177–178, and *Commentaries* on its Subsections), and contains a detailed discussion of the often misunderstood but significant assertion that no principle in the heavens is incidentally moved by itself (259b29–31), on which see the *Note* (pp. 189–191).

In Ch. 10, where Aristotle argues for the immateriality of the prime mover, he develops two lemmas, that a finite magnitude can have neither an infinite effect nor infinite power (266a10–b27), by means of arguments applying proportion theory and for the second lemma the physical proportions among mover, moved, time and movement from *Ph.* 7.5 (see the *Note on Ch. 10*, 266a10–b27 & 267b17–26, pp. 307–309). The interpretive tradition since antiquity is in complete disarray on the first argument, although sufficient evidence of both the problem that has derailed it, and the relevant ancient mathematical procedure, is there in Aristotle and Simplicius (although he is mistaken) to reconstruct the argument (see the whole treatment of 266a10–24, pp. 309–319).

Finally, also in Ch. 10, a famous doctrinal crux occurs where most scholars take Aristotle to locate the prime mover on the equator of the outer cosmic sphere it moves (267b3–9), contrary to the result in this very chapter that the former has no magnitude, unlike the equator. Here I follow an alternative construal of the text, traceable back to the Arabs, at least, as referring to the location of the first mover's effect, and provide a new explanation of its significance; see the *Analysis*, *Commentary* and *Notes* on this passage (pp. 345–349), the *Introduction* to Ch. 10 (p. 304; cf. p. 306) and the *Note on Ch. 10*, 267a21–b17 (pp. 342–343).

Terminology and Symbolism in the *Analyses*

The method used in indicating divisions in Aristotle's text and structures of reasoning, and the terminology, are as follows.

Terminology

The terms *argument* and *sub-argument* are used for both reasoning to conclusions (inferentially) and to reasons and explanations (justification).

The term *conclusion* is used for all primary claims subject to justification or explanation, as well as results of inference.

The term *premiss* is used as a matter of convenience for all claims expressing reasons or justifications, not only during passages making 'forward' inferences to conclusions.

Symbolism

Chapters are divided into primary parts by topic using the symbols *A, B, C*, etc.

Sections within these chapter-parts, or within long arguments (in the senses above), are distinguished as *1, 2, 3*, etc. This nomenclature sometimes refers to sequential sub-arguments or independent points or conclusions.

Parallel but separate arguments for the same conclusion are distinguished as *I, II, III*, etc. Sometimes such arguments will themselves include sub-arguments, either in sequence (*I.1, I.2*, etc.) or separate reasons (*II* and *III*).

Conclusions (as above) are only numbered or lettered when they also function as premisses.

Primary premisses (as above) are listed *a, b, c*, etc., and unless otherwise indicated are to be taken as co-ordinate within a single argumentative structure. Sometimes premisses are indexed to arguments in the form, e.g., *1.a*.

Secondary premisses in sub-arguments for a primary premiss are indicated as, e.g., *a.i, a.ii, a.iii* when coordinated to support (in this instance) Premiss *a*.

Tertiary premisses, e.g. supporting premiss *a.i*, are listed as *a.i.i, a.i.ii*, etc.

Where, e.g., both *a.i* and *a.ii* are together supported by a premiss, this is indicated by, in this case, *a.i/ii.i*.

Where a premiss is supported by parallel independent arguments, premisses are indicated as, e.g., *a.I.i* for the first premiss in argument *I* supporting *a*.

The symbols (i) , (ii) , (iii) , etc., when alone, or occasionally followed by Greek numerals (e.g., $i\alpha'$) are used only to list a series of points made, or of other items, such as alternative possibilities, but not as premisses in arguments or sections of text. (There are a very few obvious exceptions to this when regular numerals or unitalicised letters in parentheses have had to be used so as not to cause confusion in a given context.)

Formalised Punctuation

Punctuation within the *Analyses* (alone) is non-standard, and formalised to indicate relations among contiguous claims. The conventions introduced are the following.

A comma separates a claim (which may itself be a premiss) from an immediately following subordinate supporting premiss (thus, e.g., a comma separates a from $a.i$).

A semicolon separates one premiss from another coordinate with it, together directly supporting the same preceding claim (thus, e.g. a semicolon separates $a.i$ from immediately following $a.ii$).

A dash indicates a reversion to a higher argumentative level, for a second or subsequent premiss coordinate with one that has in the meantime itself been justified. The earlier coordinate premiss is clear from the numbering; e.g. “– but $(a.ii)$...” signifies that $a.ii$ is coordinate with some preceding $a.i$, which has meanwhile been supported by (at least) $a.i.i$.

The Everlastingness of Movement

Introduction to Chapter 1

Ch. 1 has three primary aims and parts:

- (A) to argue that there is movement, the subject of natural philosophy (250b15–23),
- (B) to investigate how it could be thought not everlasting (250b23–251a5), and
- (C) to argue that it is everlasting (251a5–252b6).

The third is by far the longest section. Aristotle defends his primary claim in Part C in three ways, arguing first from natural potencies that movement has no beginning (251a9–b10), and no end (251b28–252a5), second by an argument (between the two parts of the first) from the everlastingness of time (251b10–28), and third by methodological criticisms of alternative views, including two kinds identified in Part B, framed here as responses to imagined objections by their exponents, Anaxagoras (252a10–19), Empedocles (252a7–10, a19–32) and the atomist Democritus (252a32–b5). See similarly the Analysis by Ross (pp. 429–431), although not commenting on the chapter's overall structure.

Graham by contrast links the question of the chapter's aims to that about whose the positions Aristotle rejects are. Notwithstanding the explicit naming and reports of the views of Anaxagoras (250b24, 252a10) and Democritus (251b16, 252a34), Graham (1999, p. 183, cf. pp. 58–59) effectively takes the whole chapter as directed against Empedocles alone (named 250b26, 252a7, quoted 250b30–251a3). In particular he asserts that the whole of 251a9–252a5 is directed overall to refute the possibility of intermittent movement (Empedocles' position), rather than to establish that movement is everlasting (here Part C); and that 252a5–b5 is all directed against the Empedoclean view that intermittent movement is natural, rather than being a set of responses to a range of possible objections from all three named Presocratics, as detailed here below. Graham's view also overlooks (i) the equal relevance to Anaxagoras' position of the argument that movement is beginningless (251a9–b10), (ii) the irrelevance to Empedocles of the demonstration that time is everlasting (251b13–26), and moreover (iii) the explicit signal at 252a19–21 that a11–19 is directed to another thinker, clearly Anaxagoras (see 252a10, 14–16), although Graham (1999, p. 59)

earlier recognises this—yet only to suggest implausibly that Anaxagoras could also be thought to defend intermittent movement.

Waterlow (1982, pp. 217–219 with n. 10) speculates that Aristotle's motive for arguing that movement is everlasting is that otherwise (she claims he thinks) natural substances could not be principles of change (cf. *Ph.* 2.1). To justify attributing this *non sequitur* to him she suggests he doesn't distinguish between the ideas that nature is always in change and that change is everlasting. It seems simpler not to interpret his motives in this way. Disagreement among the Presocratics mentioned, and contemporary Academic debate about whether the creation in Plato's *Timaeus* is to be interpreted literally, sufficiently motivate the question.

Ch. 1, 250b11–15: Aristotle's Introduction

1, 250b11

Has movement at some time come to be, not having previously been, and again ceases to be so that nothing is in movement? Or did it neither come to be nor does it cease to be, but always was and always will be, and this belongs immortally and unstoppably to the things there are, as a kind of life of all things constituted by nature?

b15

Analysis

Aristotle begins *Physics* Bk 8 with a complex question. He asks, first, whether movement ever first began (since then, he implies, it must also eventually end forever; 250b11–12); second he asks, alternatively, whether movement is everlasting (if, on the contrary, it did not begin and will not cease permanently; b12–14); third he characterises it, if everlasting, as a kind of ceaseless life of all natural beings (b14–15).

Commentary

Wagner (p. 667) notes Aristotle asks here about movement in general in the cosmos, not any particular movement. Verbeke (pp. 137–144) argues that Aristotle's failure to consider the further alternatives that it began and will never cease, or had no beginning but will eventually cease (and the modality of the inferences above), is explained by (i) *Cael.* 1.10–12, where he attributes the potentials for both generation and destruction, and necessary being, to two distinct natures, and (ii) his subordination of chance to nature, and rejection of creation (cf. *Metaph.* 12.9). *Ph.* 8.6 will explain Aristotle's doctrine that terrestrial nature, involving generation and destruction, is nevertheless everlasting as part of the cosmos, due to the causal influence of astronomical necessary beings. For the

depiction of movement as the life of the cosmos (linked to the question of its everlastingness) cf. Plato *Phaedrus* 245c5–9, esp. c6–7, and *Timaeus* 36e.

Ch. 1, 250b15–23: (A) The Existence of Movement

Well all those who make claims about nature say that there is movement, because of their construction of the world (κοσμοποιεῖν) and because their whole study is about generation and destruction, whose existence is impossible without movement. But all those people who say there are limitless worlds (κόσμους), and that some worlds come to be and others cease to be, say there is always movement, since their generations and destructions must be in conjunction with movements of them. And all those others too, who say there is one world, (either always)¹ or not always, make assumptions about movement in accordance with their accounts.

Analysis

Aristotle argues here that there is movement, since (a) all natural philosophers assume this (250b15–16), because (a.i) they are all concerned with the construction of the cosmos and generation and destruction (250b16–17), since (a.i.i) those who assert infinite different *cosmoi* say they are generated and destroyed (250b17–20); and (a.i.ii) those who assert one non-everlasting cosmos must appeal to generation and/or destruction (250b21–22) – while (a.ii) generation and destruction presuppose movement (250b17–18, 20–21, 22–23); and (a.iii) those who assert there is one everlasting cosmos say it depends on movement (250b21–23).

Commentary

Aristotle begins by defending the reality of his subject, movement. The only compelling reason for this is that the Eleatics Parmenides and Zeno, and subsequently Melissus, denied it, arguing in various ways that all reality (what there is: τὸ ὄν) is unchangingly one. Aristotle rejects their denial of change in *Ph.* 1.3 and below at 8.3, 253a32–b6, 254a23–33, where he again defends the legitimacy of the subject of natural philosophy.

¹ Here the angle bracketed insertion indicates a textual supplement: see the *Note* below on 250b22 (pp. 20–21). Elsewhere angle brackets are used to indicate my supplements in the translation to clarify the meaning of the Greek text, except at 254a21 as here.

Notes

At 250b15–17, here *a–a.i*, the students of generation and destruction include all those we call Presocratics (except the Eleatics), whatever their own view of their subject was, and so undoubtedly the Milesians (Thales, Anaximander and Anaximenes) and Heraclitus, and naturally even the pluralists (Empedocles and Anaxagoras). The latter attribute generation and destruction of perceptible objects to movements among their primary parts, consistent with Aristotle's point here, although, as Graham (1999, p. 38) notes, citing Empedocles B8–12 and Anaxagoras B17, Parmenides influenced these thinkers to deny that the primary parts themselves were generated or destroyed.

At 250b18–20, here *a.i.i*, those said to claim there are infinite different *cosmoi* generated and destroyed certainly include the atomists Leucippus (D.L. 9.31 = DK A1) and Democritus (D.L. 9.44 = DK A1, Hippol. *Ref.* 1.13.2 = DK A40), almost certainly earlier Anaximander (DK A14, A17), and perhaps also Anaximenes, Xenophanes, Archelaos and Diogenes of Apollonia, according to Aetius' *Placita* 2.1.3 (DK 2A17), although not according to Alexander (fr. 539 Rashed). Aristotle opposes this group to the foregoing ('But', ἀλλ'(α), 250b18) only because they go further and (like himself) assert movement is everlasting.

Those at 250b21–23, here *a.iii*, who by contrast assert one non-everlasting cosmos, and so must appeal to generation and/or destruction, include Empedocles and Anaxagoras, as discussed below; Alexander (fr. 539 Rashed; cf. Simplicius 1121.14–15) adds Anaximenes, Diogenes and Heraclitus.

At 250b22, here *a.iii*, I accept Ross's supplement ἢ ἀεί ("either always"), whereby Aristotle claims also that those who assert there is one everlasting cosmos say it depends on movement, as in Plato's *Phaedrus* 245c–246a, although Aristotle treats the creation in the *Timaeus* literally at *Cael.* 1.10, 279b17–280a12: contrast *Metaph.* 12.6, 1071b32–33. Zekl (p. 282 n. 3) says Parmenides is meant (presumably his *Doxa*); similarly Alexander (fr. 539 Rashed), adding Xenophanes. Note that as a premiss for the conclusion that all natural philosophers assume there is movement, the claim about those philosophers who say the cosmos is everlasting must be independent of that concerning those who assert there is generation and destruction (250b16–17), since an everlasting single cosmos does not undergo generation and destruction. Graham (1999, p. 39) defends the received text as a contrast between a continuous, and an intermittent, world of finite duration (i.e., respectively Anaxagoras' and Empedocles' worlds), denying Aristotle reports any view of a single world of infinite duration before his own. But it is hard to understand the text so, and cf. above on Plato. The sense

“(just) one world or (even) not always (any)”, offered by Wicksteed (trans.) and Cornford (1934, pp. 268–269 n. *b*) is difficult from $\acute{\epsilon}\nu\alpha\ \eta\ \mu\eta\ \acute{\alpha}\epsilon\iota$ alone, and one MS and Themistius’ reading (210.11–12) support Ross; $\eta\ \acute{\epsilon}\nu\alpha\ \eta\ \mu\eta\ \acute{\alpha}\epsilon\iota$, read by Simplicius (1122.26–1123.2, cf. 1122.13–18), and in the first hand of the fairly reliable Parisian MS 1853, is also awkward. Alexander’s gloss (fr. 541 Rashed) is $\acute{\epsilon}\nu\alpha\ \kappa\alpha\iota\ \mu\eta\ \acute{\alpha}\epsilon\iota\ \eta\ \acute{\epsilon}\nu\alpha\ \kappa\alpha\iota\ \acute{\alpha}\epsilon\iota$, but I doubt that Alexander could have read just $\acute{\epsilon}\nu\alpha\ \kappa\alpha\iota\ \mu\eta\ \acute{\alpha}\epsilon\iota$, and so in later texts his η replaced $\kappa\alpha\iota$ (Rashed, p. 492). Possibly earlier *HMH* was misread for *KAIEI*.

Ch. 1, 250b23–251a5: (B) The Possibility of No Movement at Some Time

Now if it can be that once nothing was in movement, this must come about in (one of) two (possible) ways: for it is either as Anaxagoras states (for he says that everything there is was together at rest for an infinite time, and then mind introduced movement and separated things²), or as Empedocles does, that the things there are are in turn in movement and again at rest: in movement when friendship is making the one out of many, or enmity many out of one, but at rest during the times between, saying,

*So, as they have learned to grow one from more,
and again, when the one grows apart, more are perfected,
thus they come to be and have no steadfast life;
but as these nowhere cease exchanging throughout,
in this way they are always unmoving on their circle.³*

For we must suppose him to mean “as these (nowhere cease) exchanging” from this condition to that.

Analysis

Aristotle here argues that there are only two possible ways to think there might ever be no movement (250b23–24), because (*a*) one might think movement first began after an infinitely long period of rest, since (*a.i*) for example Anaxagoras claims that everything was motionless together for an infinite time

² Anaxagoras B1.13.

³ Empedocles B17.9–13 = B26.8–12.

then was moved and separated by mind (250b24–26) – while (b) otherwise one might think movement and rest everlastingly alternate, as Empedocles does (250b26–27), because (b.i) he claims love causes movement in making the one out of many, and strife does so in making many out of one (250b27–29), as (b.i.i) we see in his words in fragment B17.9–13 = B26.8–12 (cited in the translation, 250b29–251a3) – while (b.ii) Empedocles also claims that there is rest at the intermediate times (when the elements have been perfectly unified by love, or perfectly separated by strife) (250b29), since (b.ii.i) by “as these (nowhere cease) exchanging” (B17.12 = B26.11) he means between these states (of rest, respectively in perfect unity and in perfect separation) (251a4–5).

Commentary

Aristotle foreshadows views he will subsequently reject (see Ch. 1, 252a5–32), those of Anaxagoras and Empedocles, treating them here merely as exemplifications of the only two possibilities whereby movement would not be everlasting: either because it had a first beginning in time (Anaxagoras) or only occurs intermittently (Empedocles). Aristotle must argue here for an interpretation of Empedocles’ poem meaning that periods of change in the cosmos are intermittent, to support his view that on the latter’s view motionless “times between” (250b29) intervene, respectively those of perfect unity and complete elemental separation. Thus he interprets the second last line quoted, “these nowhere cease exchanging” (251a2 = B17.12 = B26.11), as referring to exchange between the two end states. (Cf. *Ph.*8.8 below for Aristotle’s argument that there must be rest at an end state.)

Note

On 251a4–5, here b.ii.i, Cornford (1934, pp. 270–271 n. a) further suggests that Aristotle misunderstands the final line quoted (251a3 = B17.13 = B26.12, “in this way they are always unmoving on their circle”) to refer to the stationary times (cf. Themistius 209.17–20, and Simplicius 1125.15–24), rather than to the elements as indestructible throughout the process of change. For references to divergent recent interpretation with discussion of Aristotle’s reading of Empedocles see Graham (1999, p. 40), Todd (trans. of Themistius, p. 136 n. 564) and Sedley (pp. 31–74, esp. p. 67 and ns).

Ch. 1, 251a5–9: (C) The Everlastingness of Movement, Introduction

251a5

Now we must consider how things are in this regard. For it is not only advantageous to see the truth with regard to the study of nature, but also

*with regard to the project concerning the first principle. Let us begin from our earlier definitions in the works on nature.*⁴

Commentary

The whole section 251a5–252b6 states and defends the main doctrinal claim of Ch. 1, that movement continues everlastingly in the cosmos. Aristotle gives (C.1) two positive arguments for the everlastingness of movement (251a9–252a5), then (C.2) replies to objections (252a5–b5). The everlastingness of movement (given the existence of things that start and stop moving) is also the main explanandum of Bk 8 as a whole (see esp. Ch. 3, 253a22–32, 254a35–b6). Solmsen (1960, p. 224) notes that Aristotle here first establishes that movement is everlasting without introducing his own conception of the primary cause, and thus “his argument {*sc.*, for the latter} gains considerably in intellectual tidiness”—i.e., he avoids a *petitio principii*. For Ibn Rushd’s notorious misinterpretation of this argument as a proof of individually everlasting movements (LC 338F6–348C1 and SC 129.2–135.11, summarised by Lettinck, pp. 639–642, 648–651) see especially Glasner (ch. 6, pp. 62–108). For Philoponus’ attack on the doctrine of everlasting movement, and defences by Ibn Bāijja and Ibn Rushd see references in Lettinck (pp. 658–660).

Note on (C.1.I) Argument From Natural Potencies (251a9–b10, 251b28–252a5)

Below I take the text out of order to follow the argumentation more clearly. Argument C.1.II from the nature of time (251b10–28) follows Argument C.1.I from natural potencies (251a9–b10, 251b28–252a5). Argument I draws on Aristotle’s distinction between potency (potentiality, *dunamis*) and activity (actuality, *energeia* or *entelecheia*) and his definition of movement in these terms (see *Ph.* 3.1–3). It is divided into two sections, establishing respectively (I.1) that movement is beginningless (251a9–b10) and then (I.2) that it is endless (251b28–252a5). The two sections are separated in Aristotle’s text by Argument II from time for the everlastingness of movement (251b10–28), probably because that too establishes that movement is beginningless, and so Aristotle introduces it immediately to reinforce the same conclusion from potencies, before turning to the topic of endlessness (which the argument from time also supports); cf. Wagner, pp. 669–670, defending Aristotle’s order.

4 *Ph.* 1–4 (see Ross, pp. 1–6, esp. 4).

Ch. 1, 251a9–21: The Beginninglessness of Movement, (C.1.I.1.1)
Overall Argument

251a9 *Now we say movement is the activity of the movable as movable.⁵ Thus*
 a10 *there must exist things that can be moved with each kind of movement.*
 Quite apart from the definition of movement, anyone would agree that
 what is capable of being moved with each movement is so moved, for
 a15 *instance that the alterable is altered, and what can change place is trans-*
 ported, so that something must first be burnable before it is burnt, and
 capable of burning something before it burns it. So these things too must
 either have come to be, having once not been, or be everlasting. Now then
 if each movable thing had come to be, before a given change another one
 20 *would necessarily have come to be, a movement in which what was capa-*
 ble of being moved or causing movement came to be.
 On the other hand it seems unintelligible if they always pre-existed as
 beings when there was no movement, ...

Analysis

Aristotle argues here that movement cannot have a beginning (supplied), by *reductio ad absurdum*, since (a) it is logically impossible for any movement to occur before a first movement (supplied); yet (b) before any putative first movement there would have to be a previous movement (251a18–20; cf. b9–10), since (b.i) things with potencies, respectively, to be moved and to cause movement must exist before any movement (supplied), because (b.i.i) whatever is moved must have the potency to be moved with the relevant kind of movement (and whatever causes movement, to cause it) (251a10–11, a13–14), since (b.i.i.i), for instance, what is burnable must exist before it is burned, and what is capable of burning something must exist before it burns it (251a15–16), for two reasons, (b.i.i.i.I) that movement is by definition the activity of the movable as movable (251a8–10; see *Ph.* 3.1, 201a10–11 and 3.1–3 *passim*); and (b.i.i.i.II) in any case, anyone would agree that whatever is moved must have the relevant potency, since (b.i.i.i.II.i) they would agree, for instance, that what is alterable is altered, and what is changeable in place is transported (251a14–15) – while (b.ii) what is moveable and what is capable of causing movement would themselves have to either have been generated or be everlasting (251a16–17); but (b.iii) the generation of what has the potency to be first moved or cause the first movement would be a prior movement (251a17–20), because (b.iii.i) a generation is a move-

5 See *Ph.* 3.1, 210a10–11 and 3.1–3 *passim*.

ment, in the sense of a change (supplied: see *Ph.* 3.1, 200b33–201a9, cf. *Metaph.* 12.2, 1069b10–14) – and (*b.iv*) it is also absurd that there could be everlastingly pre-extant things at rest with the potencies respectively to be moved first and to cause the first movement (251a20–21).

Commentary

This extended, continuous and relatively straightforward argument for the beginninglessness of movement depends primarily on the premisses (*b.i*) that a potency to be moved must precede in time any movement in a subject (unstated), (*b.iii*) that the generation of that potency would be a movement prior to a putative first (251a17–20), and (*b.iv*) that it is absurd that there could be everlastingly pre-extant things at rest with the potencies respectively to be moved first and to cause the first movement (251a20–21).

Note Section *C.1.1.1.2* of the continuing argument (251a20–b10) is presented with *Analysis* and *Commentary* following Section *C.1.1.1.1* here (pp. 27–30). These are hierarchically ordered, and in Section 2 the final premiss above (*b.iv*), is justified by the assertions that there would have to be a cause of the potency remaining inactive before the putative first movement (251a26), and that the cancellation of this privative cause would constitute a prior movement, i.e., change (supplied).

Verbeke (p. 145) accuses Aristotle of a “fundamental illogicality” in disposing of the first of his two alternative possibilities for what precedes the putative first movement, here (*b.iii*) that a first movable thing might be generated (251a17–20), on the grounds that if the matter from which it was generated had pre-existed without change, that was in fact the first movable thing, and the first alternative collapses into the second, while if that material was non-movable, the generation of the first movable thing from this was not a movement; but Aristotle need not be concerned about this, since he is entitled to specify that he means movement in the broad sense inclusive of generation, and either way his argument still dismisses the case that a first movable thing can be generated. That generation is a prior movement also undermines the force of Philoponus’ objection to *b.i*, supplied above (Ibn Bājja 194.21–195.14; Ibn Rushd *LC* 341A7–B11, cited by Lettinck, pp. 614 and 640), that an elemental body’s potential to move does not precede the movement since it moves as soon as it is generated if nothing obstructs, on Aristotle’s own account (cf. *Ph.* 8.4, 255b13–31).

Verbeke (pp. 146–147) also argues that the second horn of the dilemma, the alternative whereby the first movable thing was everlastingly inactive until the putative first movement, depends on the unstated assumption of a closed mechanical universe where no transcendent, free cause can act. This kind of

objection does not presuppose a monotheistic divine creator, since it could also appeal to the posited singularity which according to modern cosmology produced a 'big bang', and so time and the universe.

Notes

At 251a8–10, here *b.i.i.i.I*, the argument depends on Aristotle's definition of movement from *Ph.* 3.1, here given as "the activity of the movable as movable". Compare 201a11 ("the actuality of what is potentially as such"), 201a28–29 ("the actuality of what is potentially ... as movable"), and b5–6; what is movable is what is potentially moved, viz, toward some end, and so potentially at the end. Waterlow (1982, pp. 148–149 and 251) claims that here the definition of movement, by a potential for the end to which a finite movement leads, is a problem, given that Bk 8 aims to show there is a primary *endless* movement guaranteeing the everlastingness of change (see Chs. 6–9); on her view the latter is not a movement under this definition, but only on the assumption that it is the result of a distinct cause (implying the prime mover is smuggled in as a theological assumption, rather than being inferred from this movement; cf. Waterlow, pp. 246–256).

Yet in *Ph.* 3.1–3 Aristotle moves easily from treating movement as the actuality of what has a potency for an end to that of what has a potency *for the movement*, since the latter potency will always coincide with the former in whatever moves to the end. Aristotle's willingness to refer to a potential for movement (251a14–16) presupposes that identifying movements is not the task of the definition; rather that must be a matter of observation, and the problem in *Ph.* 3.1–3 is to explain *what* the phenomenon is. Thus it seems legitimate to treat the celestial movement as the activity of the potential natural to the heavenly sphere.

251a17–20, here *b.iii*, stating that the generation of what has the potency to be moved or cause movement first would be a prior movement, follows from Aristotle's conception of movement as the genus of generation and other changes (*Ph.* 3.1, 200b33–201a9; cf. *Metaph.* 12.2, 1069b10–14, and above 250b17–18, 20–21, 22–23). In *Ph.* 5.1–2, esp. 225a21–226b1, Aristotle restricts the term movement (*kinēsis*) to changes of quantity, quality, and place, admitting substantial generation and destruction as changes (*metabolai*), but not movements, since they do not occur between determinate contrary conditions. Aiming at consistency with this distinction, Themistius (210.15–17, 19–20) states that, distinct from the generation of the participants in the putatively first movement, there must be a prior movement to produce that generation: see *Ph.* 7.3, 246a6–9 (cf. b14–17), arguing generation depends on, but is irreducible to,

constituent material alterations. But Aristotle's use here of a broader sense of *kinēsis*, indistinguishable from *metabolē*, is clear from the phrase μεταβολήν καὶ κίνησιν (251a19).

Ch. 1, 251a20–b10: Beginninglessness of Movement, (C.1.I.1.2) An Original Potency

On the other hand it seems unintelligible if they always pre-existed as beings when there was no movement, as soon as you turn your mind to it; and furthermore when you draw out the implications it inevitably turns out all the more so. For if, when there are both things capable of being moved, and those capable of causing movement, at one time there is going to be something first causing movement and another thing being moved, while at a different time nothing and instead it is at rest, then this⁶ must change beforehand. For there would have been something responsible for the resting.⁷ For rest is a privation of movement. As a result, before the first change there will have been a prior change. For some things cause movement in a single way and others also cause the opposite movements, for instance as fire heats but does not cool, whereas knowledge, while one, seems to be of both opposites. Now even in the former case there seems to be something of a similar manner. For what is cold heats, by being reversed and departing, just as the knower willingly also errs, when he uses his knowledge the opposite way.

Well in any case, all those things that are capable of affecting and being affected, or of causing movement, and others of being moved, are not capable in all respects, but only when approaching each other in a given condition. Consequently when the one approaches it causes movement and the other is moved, that is to say, when it is the case that the one is capable of causing movement and the other of being moved. Well then, if things were not always in movement, it is clear that they were not in such a condition that the one could be moved and the other could cause

6 Ross (p. 688) and Cornford (1934, p. 274 n. a): the movable; Graham (1999, p. 2): the mover. The latter, though logical, is grammatically improbable. Perhaps τοῦτο means “this circumstance” (see next note).

7 Aristotle seems to mean here just that there must have been some reason of some kind for the capacities to cause movement and be moved not to operate immediately, and that circumstance must have changed before movement occurred; see further the *Analysis* and *Commentary* following.

b10

the movement, but one of them needed to change. For this must happen among relative things, as for instance if what was not double is now double, the terms must change, and if not both, at least one. Thus there will be some change before the first.

Introductory Note

As Section 2 of Argument C.1.I.1, which began in the preceding passage, this passage rejects the absurdity that there could be everlastingly pre-extant things at rest with the potencies respectively to be moved and cause movement first (251a20–21, also printed in the previous passage: see the *Analysis* there, pp. 24–25, for its role as a premiss). There are two sub-arguments for this conclusion, (I) a brief appeal to intuition (251a21–22), then (II) an argument from a privative cause (251a22–b10), by *reductio ad absurdum*, similar to that in Section 1 of the argument above. Sub-argument II is extended and complex; to facilitate reading the *Analysis* is broken into four paragraphs, and the *Commentary* following contains a summary.

Analysis

Aristotle concludes it is absurd there could be everlastingly pre-extant things at rest with the potencies respectively to be moved and cause movement (251a20–21) for two reasons, (I) by appeal to intuition, because (I.a) it is absurd that potencies to cause and undergo movement previously always existed, but without movement (251a21–22); and (II) by argument from a privative cause, because (II.a) it is logically impossible for any change to occur before a first movement (supplied); yet (II.b) for a first movement to result, there would have to be a prior change in the condition of things at rest but with potencies respectively to be moved and cause movement (251a23–26, a27–28, b6–7),

... since (II.b.i) if the subjects of the two potencies were at rest, they were not yet able the one to be moved and the other to cause movement (251b5–6), because (II.b.i.i) something would have to be responsible for the resting, that is, for the active potency not immediately acting upon the passive one (251a26), since (II.b.i.i.i) rest is the privation of movement (251a26–27); and (II.b.i.i.ii) movement occurs as soon as what can cause it is present with what can be moved by the former (251b3–5; cf. *Metaph.* 9.5, 1048a5–7, a12–21, 9.7, 1049a5–15), because (II.b.i.i.iii) the potencies, in the proper sense, to cause and experience movement presuppose subjects in the right condition and approaching each other (251b1–3) – while (II.b.i.i.iii) privative causes prevent subjects of potencies being in the right condition or approaching one another (supplied); and (II.b.i.i.iv) such causes reverse or cancel a natural potency, or reverse a rational potency (supplied),

... since (*II.b.i.i.iv.i*) causes of movement are of two kinds, (irrational causes) acting in only one way and (rational causes) producing both opposite effects (251a28–29), because (*II.b.i.i.iv.i.i*), for instance, fire heats, but does not cool, but the same knowledge can produce opposite effects (251a29–30) – yet (*II.b.i.i.iv.ii*) both kinds of causes can prevent the natural effect (251a31), since (*II.b.i.i.iv.ii.i*), for instance, something cold can heat things, by being reversed and departing, or an expert can use his knowledge in an opposite way to deliberately make a mistake (251a31–b1) –

... but (*II.b.ii*) it would take some prior change or movement to put the subjects of the two potencies, respectively to cause and undergo movement, which were at rest, into such a condition that the one caused movement and the other was moved (supplied), since (*II.b.ii.i*) when one moves the other their relationship has already changed (supplied); and (*II.b.ii.ii*) a change in relationship requires a change in one of the terms (251b7–8), since (*II.b.ii.ii.i*), for instance, when one term becomes double the other, having previously not been so, either one or both terms must have changed (251b8–9).

Commentary

In summary the overall argument of the passage is that it is impossible that there could be everlastingly dormant potencies that suddenly first acted to produce movement, since there would have to be a movement before the putative first (251a23–26), because the relationship between inactive mover and inactive moved can only change if at least one of the participants changes (251b7–8), exemplified by numerical ratios (b8–9); that change would then be a prior movement, but it is logically impossible that any movement occur before a first, and so there cannot be a first, and movement is beginningless.

Accordingly, the main premisses of Sub-argument *II* for this conclusion are (*II.a*) that it is logically impossible for any change to occur before a first movement (supplied); yet (*II.b*) for a first movement to result, there would have to be a prior change in the condition of things at rest but with potencies respectively to be moved and cause movement (251a23–26, a27–28, b6–7), because (*II.b.i*) if the subjects of the two potencies were at rest, they were not yet able the one to be moved and the other to cause movement (251b5–6; justified a26–b6); and (*II.b.ii*) some prior change or movement would be needed to enable this (supplied; justified b7–9).

Notes

Scholars disagree on the role of 251a28–b1, here supporting *II.b.i.i.iv* following Cornford (1934, p. 274 n. *b*), and cf. Philoponus (882.19–883.9): accordingly it aims to justify the idea of a privative cause, *contra* Ross (p. 688), calling it a

digression, and Zekl (p. 282 n. 10), an intrusive gloss. Graham (1999, pp. 44–45) treats it as an argument that the relevant capacities should otherwise act automatically, consistent with Cornford and Philoponus, and similarly Wagner (pp. 668–669), calling it a concession anticipating 251b1–10, although he treats that as a separate argument against an uncaused activation of potencies; but as Ross rightly notes, how overcoming a privative cause requires movement is then shown at b1–10. Simplicius (1128.19–25) complicates matters, noting that for Aristotle nature is a source of rest as much as movement (*Ph.* 2.1, 192b21–23), and appeals to the need for a cause of any natural phenomenon in addition to the nature itself, to defend Aristotle's requirement for a cause of rest. Aquinas (8.976) gives a better account of the text, at least, treating rest, *qua* privation, as accidental to nature and therefore requiring a specific cause.

Ch. 1, 251b28–252a5: (C.1.I.2) The Endlessness of Movement

(For 251b10–28 see below, pp. 32–36.)

251b28 *The account is the same regarding the fact that movement is indestruc-*
 b30 *tible. For just as, in the case of a movement coming to be, it turned out that*
 there was some change before the first, so here there is one after the last.
 For something doesn't stop being moved and being movable jointly, for
 instance burning and being burnable (since it is possible for something
 252a1 *not burning to be burnable), nor does something stop causing movement*
 and being capable of causing movement jointly. And accordingly what is
 destructive will need to be destroyed when it has destroyed. And what is
 destructive of this, again later. For of course destruction is a change. Now
 if this is impossible, clearly there is everlasting movement, instead of it
 having been at one time but not at another. For to talk about it that way
 seems more like fiction.
 a5

Analysis

Aristotle argues here that there can be no end to movement in the same way that there can be no beginning (251b28–29), because (a) movement is indestructible (251b29), since (a.i) it is logically impossible for any movement to occur after the last (supplied); but (a.ii) if it were to cease, another movement would occur after the last (251b29–31), because (a.ii.i) the potency to be moved or to cause movement does not cease at the same time as, respectively, something stops being moved or causing movement (251b31–252a1), because

(*a.ii.i.i*) a potency in a subject may not to be active (supplied), since (*a.ii.i.i.i*), for instance, what is burnable may not be burnt (251b32–33) – but (*a.ii.ii*) if movement ceased, the potencies respectively to cause and experience it would either have to be independently destroyed or remain thereafter everlastingly inactive (supplied); yet (*a.ii.iii*) if the potencies remained thereafter, another movement would occur after the last (supplied), because (*a.ii.iii.I*) that potencies would remain everlastingly inactive is intuitively absurd (supplied: cf. above 251a20–21); and (*a.ii.iii.II*) a further movement establishing a privative cause would be required to render them inactive (supplied: cf. above 251a23–b9) – but (*a.ii.iv*) if the potencies were independently destroyed, another movement would occur after the last (supplied), since (*a.ii.iv.i*) in that case there would be something with the potency to destroy the former potencies (supplied); and (*a.ii.iv.ii*) something else with a destructive potency would be needed to destroy this destructive potency (252a1–2), because (*a.ii.iv.ii.i*) if the destructive potency was not then itself destroyed, it would continue causing destruction (supplied) – but (*a.ii.iv.iii*) a third destructive potency would have to destroy the second destructive potency (252a2); (*a.ii.iv.iv*) *et cetera*; but (*a.ii.iv.v*) destruction is a movement, as a change (252a2–3).

Commentary

The structure of this argument generally parallels that for the beginninglessness of movement in *C.1.I.1* (251a9–b10), and relies on the same conception of natural potencies. Aristotle's initial rejection there of the intelligibility of everlastingly inactive capacities (251a20–22) applies here too; the deeper implications for a first movement (251a22–b10) followed from the same principle underlying his rejection of *generated* capacities to cause and experience a first movement (251a17–20): the requirement for a preceding movement, contradicting the assumption. The analogous principle for a last movement is first invoked in general terms (251b29–252a1, here *a.ii–a.ii.i*), and then Aristotle applies it to argue against a final destruction (concentrating on the destructive potential alone, since the passive potential *is* destroyed with its subject); he leaves implicit the corresponding application against everlastingly inactive capacities.

On Premiss *a.ii.i.i*, supplied, that it is possible for a potency not to be active in its subject, cf. Ross (p. 689). Cornford (1934, pp. 278–280 n. *a*), following Themistius (212.13–19) rightly argues that we require an equivalent of the whole dilemma at 251a16–b10 implying beginninglessness; accordingly 251b31–252a1, here *a.ii.i*, claiming that the potency to be moved or to cause movement does not cease at the same time as, respectively, its subject stops being moved or causing movement, must anticipate and reject both the possibility that all

potential agents and patients perish with the last movement, and also that they could continue to exist ineffectively: hence *a.ii.ii* and *a.ii.iii* with support must also to be supplied.

Aristotle only concentrates explicitly on the case where the remaining potencies after the last putative movement would then cease to exist, and there on the implication that there would have to be an agent of destruction that itself would need to be destroyed in a further change, to prevent it from causing further changes (252a1–3, here the support for *a.ii.iv*), since the potential to *be* destroyed *is* destroyed with its subject. Both Cornford and Ross (see above) consider this argument an afterthought, but, as Graham (1999, p. 50) apparently recognises, it is better taken as filling in the gaps in part of the main argument. It is in fact the only part that doesn't have an exact parallel in the preceding argument for the beginninglessness of movement.

Simplicius (1170.10–36) defends Aristotle against a significant objection, that the final movement might just be the destruction of the movable, so that no further movement could be possible; Simplicius proposes that any such destruction would be merely a transformation into another kind of movable subject. But it remains at least logically possible that after the final movement there might no longer be a mover and movable with specifically corresponding potentials, which alone could together produce further movement; thus Aristotle's argument fails.

Ch. 1, 251b10–28: Argument (*C.1.II*) from the Nature of Time

251b10 *In addition to this, how will there be 'before' and 'after' if there is no time? Or time if there is no movement? Now if time is the number of movement, or a certain movement, if indeed there is always time, movement too must be everlasting. But in fact apart from one fellow, everyone seems to be in*
b15 *agreement about time, at least. For they say it is ungenerated. And on this basis Democritus in fact demonstrates that it is impossible for everything to have been generated, since time, he says, is ungenerated. But Plato alone generates it. For he says that it has been generated together with the heavens, and that the heavens have been generated. Well, if it is*
b20 *impossible for time to be, and to think of it, without the 'now', and 'now' is an intermediate, containing both a beginning and an end together, a beginning of time that will come, and an end of past time, there must always be time. For the last part of the final time that is supposed will be*
b25 *in some 'now' (for it is not possible to suppose anything in time without 'now'), so that since 'now' is a beginning and an end, there must be always*

time on both sides of it. But in fact if actually there must be time, clearly there must be movement too, if indeed time is a feature of movement.

Analysis

Here Aristotle argues that movement is everlasting because (a) movement is as extensive as time (251b11–12), since (a.i) time is either the number of movement, or a kind of movement, or an effect of movement (251b12–13, b27–28; cf. *Ph.* 4.11, 219b2–10 and generally 4.10–14) – and (b) time is everlasting (251b13, b22–23, b26–27), supported by two separate arguments, (I) from the virtual consensus of the wise (251b14–19); and (II) from the nature of ‘now’ (251b19–26).

By Argument I time is everlasting because (b.I.i) all thinkers apart from Plato say time is ungenerated (251b14–15), since (b.I.i.i) Democritus, for example, infers thereby that it is impossible that everything (altogether) was generated (251b15–17) – while (b.I.ii) Plato (admittedly) says time was generated with the heavens (251b17–19). By Argument II from the nature of ‘now’ time is everlasting because (b.II.i) the extreme point of the putative end (or beginning) of time would be a ‘now’ (251b23–24), since (b.II.i.i) every point in time is a ‘now’ (251b19–20, b24–25) – but (b.II.ii) there is always time on both sides of any ‘now’ (251b26; cf. b10–11), because (b.II.ii.i) a ‘now’ is both the end of preceding time, and also the beginning of future time (251b21–22, b25), since (b.II.ii.i.i) a ‘now’ is a midpoint (251b20).

Commentary

The argument from time that movement is everlasting depends on the inference that if time is everlasting, then so is movement, which Aristotle justifies on the basis that time is somehow epiphenomenal to movement (251a12–13). Here and at b27–28 Aristotle explains time as either the number of movement, or a kind of movement, or an effect of movement (cf. *Ph.* 4.11, 219b2–10 and generally 4.10–14). Sorabji (1983, p. 81) notes that while in Bk 4 Aristotle infers the definition of time as the number of movement from the result that it is coincident with change (218b21–219b2), here he infers the latter from the former.

Sorabji (1983, pp. 276–277, cf. 279–280) identifies three arguments in 251b10–28, the first, “a hint of the argument” that a putative beginning of time implies its previous absence, but that previousness itself implies time before the putative beginning; the other two are indisputably present, that from the virtual consensus of the wise (251b14–19) and that from the nature of the ‘now’ (251b19–26). Verbeke (pp. 147–148) attributes the same first argument as Sorabji to Aristotle, and calls it a paralogism, appealing to Aquinas, *Summa contra gentiles* 2.36 (cf. on Aquinas’ view below), and then only the final argument. Sorabji

must infer his first from 251b10–11, but the question this states, “how will there be ‘before’ and ‘after’ if there is no time?” merely anticipates the key premiss of the argument from the nature of a ‘now’ at b26, here *b.II.ii*, that there is always time on both sides of any ‘now’.

Argument *I* from the consensus of the wise (251b14–19) asserts that, excepting Plato, all thinkers say time is ungenerated. The only evidence given is the case of Democritus the atomist, but it follows for anyone whom Aristotle includes with Democritus as claiming movement had no beginning (cf. above on 250b18–20), and in other cases he is presumably relying on the absence of contrary claims.

Graham’s analysis (1999, pp. 47–48) of Argument *II* is problematic. His (1) roughly corresponds with *b.II.i.i* here (that every point in time is a ‘now’, 251b19–20, b24–25), his (2) is *b.II.ii.i.i* here (that a ‘now’ is a midpoint, 251b20), his (3) is *b.II.ii.i* here (that a ‘now’ is both the end of preceding time and also the beginning of future time, 251b21–22, b25), his (4) is *b.II.ii* here (that there is always time on both sides of any ‘now’, 251b26; cf. b10–11), his (5) bears some relation to *b.II.i* here (that the extreme point of the putative end, or beginning, of time would be a ‘now’, 251b23–24), and his (6) is the conclusion that time is everlasting (251b13, b22–23, b26–27). Graham seems to derive (3) from (2) as I do, but perhaps thinks his (1) is also involved; and he seems to be wrong then to derive his (4) from (1), (2) and (3) together, given that the text explicitly derives *b.II.i*, not *b.II.ii* directly from *b.II.i.i*, roughly his (1): note γάρ, 251b24. Again, Graham’s (5), “For any arbitrary moment of time, whether past or future, (4) holds true”, is his attempt to supply an “inductive leap” to a generalisation of which the text’s *b.II.i* is in fact better understood as an application, while the generalisation itself is axiomatic in the text’s second statement of *b.II.i.i* (οὐδὲν γάρ ἔστι λαβεῖν ἐν τῷ χρόνῳ παρὰ τὸ νῦν, b24), in contrast to Graham’s corresponding (1), “The existence of the now is a necessary condition for the existence of time”.

Notes

For the report at 251b17–19, here *b.I.ii*, that Plato denied the beginninglessness of the time, as Aristotle interprets the *Timaeus*, see also *Cael.* 1.10, 279b17–280a12, but cf. *Metaph.* 12.6, 1071b32–33. See Graham (1999, pp. 46–47) for references to divergent interpretation of the *Timaeus*’ claim (38b–c, cf. 28b) that time was generated with the heavens. Sorabji (1983, p. 72; cf. p. 269) states,

in *Phys.* 8.1 Aristotle argues against Plato’s creation of time in a way that is appropriate only if “time” means what it means for us. It does not occur to Aristotle that Plato could have been confining his attention to the restricted concept of *measured* time. (His emphasis).

This is a bit misleading: Aristotle is not arguing primarily against Plato's conception, despite his passing acknowledgement of it as an exception to the general recognition that time is everlasting, and his own doctrine that time is the number of movement (251b12), but against the beginning of time in a more primordial sense, as the passage from past to future (see 251b19–26). The question whether and why time must always be ordered and so (perhaps) a measure (contradicting Plato's myth in the *Timaeus*, interpreted literally) is not raised here. (In *Metaph.* 12.6, 1071b31–1072a3, Aristotle recognises that the *Timaeus* posits movement, and so a primordial sense of time, before the creation of the heavens.) Coope (p. 80 n. 29) also thinks that Aristotle at the present point argues against Plato's claim that time was created, but (p. 109 n. 17) she argues that Aristotle's conception of time, as the number of change, does not imply that he thinks of it as a measure.

On the premiss that a 'now' is a midpoint (251b20, here *b.II.ii.i.i*), Graham (1999, p. 47) notes that, as a *mesotēs*, a 'now' is also a geometric mean (it stands to an earlier time in the same relation a subsequent time stands to it), yet this does not affect the argument here. Verbeke (pp. 147–148) criticises this argument in that the definition of the 'now' as a midpoint presupposes what he has to show, that there is no first 'now'. Nevertheless Aristotle can defend this view, if time is continuous (*Ph.* 6.1–4, 6.9, 8.8), and so not composed of 'nows', contrary to what Verbeke asserts (p. 147), and if a now is not an atom of time, then nows don't follow one after another, and so there cannot be an absolute first. Again Philoponus (823.15–20) seems wrong to interpret Aristotle to mean at 251b19–20, here *b.II.i.i*, that time *only* exists (ὑφέστυχεν) in the 'now'.

Both Simplicius (1167.5–16) and Aquinas (8.983) report Philoponus' objection that to assume every 'now' is a midpoint is equivalent to assuming that every point on a line is a midpoint, which would imply that every line was infinitely long. But the analogy with a finite line is misleading: the first point of the line divides it from extension that does not belong to the line segment; time is comparable, rather, with extension in this respect. Note also, notwithstanding Aristotle's steady-state view, his account of 'now' might not be inconsistent with the universe and time beginning, for instance in the 'big bang' in modern cosmology, so long as the latter did not occur at a 'now', and all 'nows' are taken as points in time thereupon elapsed; and analogously for the end.

Simplicius' reply (1168.15–21) to Philoponus' objection, by contrast, rejects the comparison of time with a line entirely, explicating a 'now' as a specifically *temporal* midpoint, as the present, intrinsically implicating both past and

future, from which it is essentially differentiated, so that there can be no first or last ‘now’. Aquinas (8.984) first rejects the objection dialectically, arguing that to conceive of a time before or after which there is no other is to rely on the sense of the terms ‘before’ and ‘after’, but there can be no such ‘before’ or ‘after’ without time; subsequently (8.990) he defends Christian doctrine, claiming that time before creation is merely imaginary and that (in effect) since the expression in which ‘before’ is used here is negative specifically in relation to time, it has no reference.

Note on Ch. 1, 252a5–b5: (C.2) Replies to Methodological Objections

Aristotle ends the chapter by rejecting the positions he anticipated above (250b23–251a5) as the only possible alternatives to his claim that movement is everlasting, Anaxagoras’ view that there was a temporal beginning to the cosmos, and Empedocles’ that movement alternates with periods of rest throughout infinite time. The common feature of their theories can be formulated as an objection to Aristotle’s reasoning *tout court*, that it is just a brute fact of nature (πέφυκεν οὕτως, 252a6) that their principles are correct (252a5–11). Aristotle’s reply criticises first Anaxagoras’ principles (252a11–19), then Empedocles’ (252a19–32). Finally he discusses the general question, when and how a first principle requires justification (252a32–b5); his allusion to the atomist Democritus at 252a34–b2 contains an implied criticism, apparently that despite accepting that movement was everlasting, he failed to start from a self-evident first principle, choosing the wrong kind.

Ch. 1, 252a5–11: (C.2.1) Objections Appealing to Brute Facts

252a5 *And similarly too, <it is fictitious> to say that this is just the nature of things, and that you have to believe this is the principle, which it seems that Empedocles would say, that it is a necessary feature of things that friendship and enmity in turn take power and cause movement, and they*
 a10 *rest during the time in between, —and perhaps those like Anaxagoras who appoint one such principle would also say so.*

Analysis

Aristotle imagines an objection to his position that movement cannot begin absolutely, which argues (a) that it is just a brute fact of nature, not requiring further explanation, that movement had a beginning (252a5–7), since (a.i) for

instance Empedocles would presumably say that it is just a necessary feature of things that friendship and enmity in turn take power and cause movement, and that they rest during the time in between (252a7–10); and (*a.ii*) presumably Anaxagoras and others who posit one principle of movement would say the same kind of thing (252a10–11).

Commentary

At 252a7–10 Aristotle seems to mean that Empedocles' theory implies that friendship and enmity reciprocally rise and fall in dominance, and during periods of imperfect dominance they each cause movement, but when perfectly dominant, rest; cf. Graham (1999, p. 52), and above on 250b23–251a5. Simplicius (1183.24–1184.19) mentions both Eudemus' interpretation of Empedocles, with the reign of friendship producing motionlessness, and enmity movement, and his own that motionlessness came in between the opposed periods of the movements of each power (but Sedley, pp. 62–66, argues that Simplicius is mistaken in reporting that this occurred at the end of every such period). Sorabji (1980, p. 18 n. 36) lists references to Aristotle's reports of Empedocles' appeals to necessity. Anaxagoras' single principle (252a10–11) must be his cause of movement, intellect (*nous*): see B13 for its spontaneous initiation of movement.

Ch. 1, 252a11–19: (C.2.2) Reply to Anaxagoras and Others

But in fact there is nothing disorderly in things that are natural and accord with nature. For in all cases nature is responsible for order. There is no proportion (λόγον) in the ratio of the infinite to the infinite, but every order is a proportion. To be at rest for an infinite time, then at some moment to be moved, and for there to be no distinguishing feature of this, that it happens now rather than previously, and that furthermore it has no order, is no longer the product of nature. For what is natural is either simple, and not one way at one time but otherwise at another (as for instance fire is transported upwards, and not just at one time but at another not), or else there is a reason (λόγον) why it is not simple.

252a11
a15

Aristotle responds to Anaxagoras, giving two separate arguments, (*I*) from natural order (252a11–14); and (*II*) from the principle of sufficient reason (252a15–19).

Analysis

He concludes that it would be unnatural for movement to begin at one otherwise identical moment after an infinite period of rest (252a14–16), by Argument *I*, since (*I.a*) nothing natural or in nature is disorderly (252a11–12), because (*I.a.i*) nature is a cause of order in everything (252a12) – but (*I.b*) an infinite period of rest followed by an infinite period of movement would be disorderly (supplied), since (*I.b.i*) there is in no (definite) proportion (*logos*) in the ratio of the infinite to the infinite (252a13) – and (*I.b.ii*) every order is a proportion (*logos*) (252a13–14) – and by Argument *II*, because (*II.a*) natural phenomena behave in one of two ways: either they are simply so and do not change or there is a reason (*logos*) why they are not simply so (252a17–19), since (*II.a.i*), for instance, fire always rises upwards (252a18–19) – but (*II.b*) there could be no reason for movement to begin at one moment that is identical with all that preceded it, because (*II.b.i*) there would be no distinguishing feature of the moment at which movement began (252a15–16).

Commentary

Stating the conclusion (252a14–16), Aristotle refers distinctly to the basis of both Arguments *I* and *II* here, the lack of order and lack of sufficient reason (although the other way round). Zekl (p. 283 n. 17) remarks on the “profoundly speculative” principle of the first argument, that all kinds of order in nature are proportions (252a13–14), and he cites parallels elsewhere in Aristotle; cf. also Wagner (p. 671). Lang (1998, p. 3 n. 1) relates the principle that nature is a cause of order here more generally to the claim that it does nothing in vain (for which see her references, loc. cit.). The second argument (252a15–19) seems to derive from Parmenides’ argument against generation (fr. B8.9–10).

Note

Lang (1998, p. 3 n. 1) cites 252a17, in *II.a* here, referring to the constant automatic behaviour of natural things, together with 252a12, here *I.a.i*, asserting nature is a cause of order, suggesting she doesn’t recognise these belong to two distinct arguments; but that fire rises (a18, here *II.a.i*) does not exemplify something with *logos*, since it happens always, and in the second argument the point is that there is a *logos* (reason) when something that is *not* always so happens (a15–16, a18–19, here *II.b.i* and *II.a*, second alternative), not that there is a *logos* (proportion, order) in elemental movement. Philoponus’ example of proportion (823.21–23) seems to describe the expression of distinct elemental powers in a compound, unless he refers to their alternating predominance in the seasons (cf. 883.10–15).

Ch. 1, 252a19–32: (C.2.3) Reply to Empedocles

Hence it would be better as Empedocles says, and anyone else who has said that this is the case, that the whole is in turn at rest and then again in movement, since that at least has some order to it. But even this the speaker must not say alone: he must give an explanation of it, and not suppose anything, nor make an irrational (ἄλογον) postulate, but provide an argument from examples or a demonstration. For the principles he supposes are themselves not explanatory, nor is this⁸ the essence of friendship or enmity, but combination is characteristic of one and separation of the other. And if he is to specify as well that they alternate, he should state the circumstances in which they do so, just as he should say there is one thing that combines people, friendship, and that enemies flee one another. For he supposes that this also is the case in the whole world, since it is evident in some circumstances. He also lacks a reason for the claim that the alternation is over equal periods of time.

Analysis

Aristotle makes three main points here, evaluating Empedocles' theory, (a) that (admittedly) his view is better insofar as he claims the whole is alternately at rest and in movement (252a19–21), because (a.i) such a situation is orderly (252a21–22), since (a.i.i) there is a definite proportion between the durations of periods of movement and rest (supplied: cf. 252a11–14, Argument I against Anaxagoras) – nevertheless (b) someone claiming this about the cosmos should not only assert what its order is, but explain it, and, rather than making unjustified assumptions, derive them by inference from examples or demonstration (252a22–25); whereas (c) Empedocles fails to do this (supplied), which two separate arguments show, (I) from his failure to explain (252a25–27); and (II) from his not deriving his principles (252a27–32).

In Argument I Aristotle claims (c.I.i) that Empedocles' principles are not explanatory (252a25–26), since (c.I.i.i) the essences of friendship and of enmity are not to be immediate causes of both movement and rest (252a26), because (c.I.i.i.i) the essence of friendship is, rather, to combine, and of enmity to separate (252a26–27). In Argument II from Empedocles' not deriving his principles, Aristotle argues (c.II.i) that Empedocles makes unjustified assumptions (supplied), since (c.II.i.i) he fails to specify circumstances in which these principles alternate, beginning for instance with their effect among human beings

8 I.e., immediately to cause both movement and rest.

(252a27–30) – and (*c.II.i.ii*) he fails then to derive the universal roles of friendship and enmity by induction (supplied: cf. 252a30); but (*c.II.i.iii*) he should do that (252a28), since (*c.II.i.iii.i*) he does assume they have the universal roles, respectively, of combining and separating (252a30); and (*c.II.i.iii.ii*) the appropriate method would be inference from examples (supplied), since (*c.II.i.iii.ii.i*) obviously love combines people, and enmity drives them apart (252a30–31) – and furthermore (*c.II.i.iv*) he fails to justify the claim that they alternate over equal periods (252a31–32).

Commentary

This passage first gives qualified approval to Empedocles' method of explanation (252a19–25, here *a* and support, along with *b*), acknowledging that his system does provide order (a21–22), but asserting the need to justify the kind of order attributed to the cosmos. Secondly it criticises Empedocles for failing to do that, providing two reasons, first that the principles of his order do not explain it (a25–27, here Argument *I*), and second that he does not derive the way they operate from anything more obvious (a27–32, here Argument *II*).

Aristotle's methodological prescription at 252a22–25, here (*b*), that a cosmologist should explain cosmic order by inference from examples (*ἐπαγωγῇ*, *epagōgē*) or demonstration, is clearly meant to describe his own procedure; certainly *Ph.* 8 overall attempts a causal explanation of movement, with some appeal to cosmic order in Chs. 6–10, while epagogic inference is often used, particularly in dialectical arguments, and arguments from his own principles established elsewhere; cf. Wagner (p. 398 on *Ph.* 1.2, 185a13–15), on *epagōgē*.

Note

Aquinas (8.994) plausibly suggests that 252a26 (here taken as the claim *c.I.i.i*, that as principles friendship and enmity do not immediately explain both movement and rest), denies, rather, that the former alternate as cosmic principles; nevertheless that seems to be a separate point (252a27–32, Argument *II*) and part of the criticism for lack of derivation, not lack of explanation. See Sedley (p. 69 n. 105) for discussion of whether Aristotle means that Empedocles posited equal periods of movement and rest. I assume rather that 252b31–32 refers to the claim that the periods in which friendship and enmity, respectively, cause movement are equal. Note that Aristotle does not reject the use of explanatory principles like friendship entirely in cosmology, since in *Metaph.* 12.7, 1072b3 he attributes the movement of the first heavenly sphere to love (*erōs*).

Ch. 1, 252a32–b6: (C.2.4) Universality of Principles

But universally to think that it is a sufficient principle, if something always either is so or comes to be, is not a correct assumption. Democritus bases his explanation of nature on this, that previously also things came to be this way: he does not judge it appropriate to seek for a principle of its being everlasting, speaking correctly for some cases but not for everything. For certainly the triangle always contains angles equal to two right angles, but all the same there is some distinct explanation of this everlastingness; nevertheless of those principles that are everlasting there is no distinct explanation.

252a32

a35

252b1

Well then, let this be our complete account regarding the fact that there neither was nor will be a time when movement either was not or will not be.

b5

Analysis

This passage contains three primary claims, the first articulating an objection, and then two more constituting Aristotle's reply, all supported explicitly or implicitly by further claims. The objection runs (1), if something always either is so or happens, that is a sufficient principle (252a32–33), since (1.a), for instance, Democritus derives his explanation of nature solely from the claim that things were previously also the way he says (252a34–35), because (1.a.i) he does not judge it necessary to seek any further principle for the claim it is always so (252a35–b2). Aristotle replies (2) that to suppose this in all such cases is not correct (252a33–34), because (2.a) it is not sufficient in cases where it is not evident without further reason that something always is so (supplied), since (2.a.i), for instance, the internal angles of a triangle equal two right angles, but a distinct fact is responsible for this everlasting truth (252b2–4) – while (3) nevertheless no distinct fact is responsible for true everlasting principles (252b4–5), because (3.a) nothing is prior to a first principle (supplied).

Commentary

Here Aristotle effectively answers an objection the atomist Democritus might make to his criticism of Empedocles for not justifying his principles, by distinguishing between different cases. Democritus must think it is sufficient to justify an explanation by claiming it has always been so, i.e. is universally true, yet only in certain cases can no further explanation be possible for what is universally true. Aristotle illustrates this from mathematics: theorems, such as that a triangle's internal angles add up to two right angles, are always true but as deducible from other, prior truths, they are not principles just *qua* always

true; a principle has a further characteristic, being in effect recognisably true in virtue of itself. [Plutarch] *Stromateis* 7 reports that Democritus claimed there was no ἀρχή (*archē*) of the causes of what happens: if Democritus himself used this term, Aristotle possibly misunderstood this as meaning no (other) *principle*, rather than no *beginning*. That could explain his thinking that Democritus believed an explanation is sufficient if something is said to be always so.

Defence against Three Objections

Introduction to Chapter 2

Ch. 2 contains statements of and responses to three objections to Aristotle's substantive position in Ch. 1 (independent of the objections to his form of reasoning implied by the views of Anaxagoras, Empedocles and Democritus, and his treatment of them, that end Ch. 1; see 252a5–b5 above). The objections in Part *A* of Ch. 2 divide into two categories, one (252b9–12) based on Aristotle's account of change in *Ph.* 1 as necessarily occurring between *termini*, and the other (252b12–28) proposing two putative instances of a contradictory paradigm, that movement can begin from nothing (the origination of movement in lifeless, and living, things); Zekl (p. xxxviii) categorises these similarly. In Part *B* Aristotle answers each in turn (252b28–253a2, 253a2–7, and 253a7–21). Aristotle's responses foreshadow the major topics in the rest of *Ph.* 8: the everlastingness of rotation (8.7–9); the role of the cause of movement (8.4–6, 10); and the explanation of self-moving beings (8.5–6).

Ch. 2, 252b7–28: (*A*) Three Substantive Objections

It is not difficult to refute objections to this. It might seem most possible that movement exists, having once not been at all, to those who start from the following considerations in their investigation: first, that there is no everlasting change; for every change is naturally from something into something, so that necessarily as a boundary for each change there is the opposite condition into which it comes to be, and nothing is moved boundlessly. 2, 252b7 b10

Next, we see that it is possible for something to be moved that is neither in movement nor has any movement within itself, for instance in the case of lifeless beings: although neither any part nor the whole of these is in movement, but rather at rest, at some moment it is moved. But it would have been fitting for it either always to be in movement or never, if in fact movement does not come to be after having not existed. And it is most particularly clear that this kind of thing is so in the case of living beings. For sometimes when there has been no movement in us, and we were quiet, nevertheless at a certain moment we are moved, and a principle of b15

b20 *movement comes to be within us from ourselves, even if nothing outside moves us. For we do not see this happening the same way in the case of lifeless beings, but on each occasion something else outside moves them. But we say an animal is that which moves itself. Consequently if it is ever at complete rest, movement could come to be in something motionless from itself and not from outside. But if this can come to be in an animal, what prevents the same thing from also happening with respect to the whole of things? For if it occurs in a small structure (κόσμῳ), it also does in a large one. And if in the cosmos, also in the infinite, if in fact it is possible for the infinite as a whole to be moved and to rest.*

b25

Analysis

Aristotle anticipates two potential objections to the doctrine of Ch. 1, (I) from his own analysis of movement, (I.a) that change is not everlasting (252b9–10, b12), because (I.a.i) every change must occur between opposed boundaries (252b11–12), since (I.a.ii) every change is from some one to another condition (252b10) – and (II) from the origination of movements, (II.a) that the movement of the cosmos as a whole might have begun from rest (supplied), for two separate reasons, (II.a.I), from the case of lifeless things (252b12–16); and (II.a.II), from the case of living things (252b17–28). By Argument II.a.I all movement might have once begun from rest, because (II.a.I.i) what happens in an individual case might happen in the cosmos as a whole (supplied); and (II.a.I.ii) it is possible for something entirely motionless in its parts and as a whole to be set in movement at some time (252b13–15), for two separate reasons, (II.a.I.ii.I) that we see this in the case of lifeless things at rest, that at some moment are moved (252b12–15); and (II.a.I.ii.II) if it were not so, everything would have to be always at rest or always in movement (252b15–16). By Argument II.a.II, from the case of living things, the movement of the cosmos might have begun from rest, because (II.a.II.i) what happens in an individual living thing might happen in the cosmos as a whole (252b24–26), since (II.a.II.i.i) what happens in a small structure (*cosmos*) also happens in a large one (252b26–27) – and (II.a.II.i.ii) movement can begin in an animal at rest entirely from an internal principle of movement without any external cause (252b18–21, 23–24), for two separate reasons, (II.a.II.i.ii.I) that this is obvious in our own case (252b17–21); and (II.a.II.i.ii.II) that we say animals move themselves (252b22–23).

Commentary

Compare the first objection (252b9–12), that no change is everlasting because change must occur between opposed boundaries, since every change is from one to another condition, with *Ph.* 1.7 (also 1.9), and 5.1–2: the objection rests on

Aristotle's own doctrine; see also Graham (1999, pp. 59–60). Zekl (p. 283 n. 23) mistakenly implies that Aristotle has (without exception) affirmed the basis of this objection (that no movement is everlasting, 252b9–10) in *Ph.* 6.7 and the third part of 6.10: rather, the former merely argues that either to traverse a finite distance in an infinite time (237b23–238a19), or for an infinite movement to take a finite time (238a20–b22), is impossible, while the latter specifically notes that rotation can be everlasting (241b18–20). In fact the main task of Bk 8.7–9 is to demonstrate this, in order to show how movement in the cosmos generally can be everlasting.

The second objection, in general terms, is that the cosmos's movement altogether might have begun from rest, for two reasons, each an apparent counterexample: the first assumes, and the second claims, an analogy between an individual thing and what might happen in the cosmos as a whole: see 252b24–26, here *II.a.II.i*.

The first, the case of lifeless things (252b12–16), argues it is possible for something entirely motionless in parts and as a whole to start moving at some time (252b13–16), both on the basis of perception (25b12–15, here *II.a.I.ii.I*); and because otherwise nothing could change from rest to movement (b15–16, here *II.a.I.ii.II*). Ch. 3 again reviews the possibility this rejects, that each thing is either always at rest or always in movement, where Aristotle develops and analyses a schema covering all possibilities for movement and rest. This schema is the basis of the inquiry throughout the rest of Bk 8, enabling Aristotle to show there are three different kinds of beings: those alternating between movement and rest, those (the heavenly spheres) always in movement, and the prime mover, as always unmoved.

The second reason for the second objection (252b17–28, otherwise called a third objection) focuses on living things. Aristotle argues (252b17–24) that cosmic movement may have started from nothing since movement in animals starts entirely from within, as both we ourselves do so, and we say animals move themselves. Aristotle adds that this differs from lifeless beings, which require an external mover (b21–22, here *II.a.II.ii*); this undermines Argument *II.a.I* above from the movement of lifeless things, anticipating his answer.

Aristotle extends a microcosm-macrocosm analogy (252b24–27, here *II.a.II.i–II.a.II.i.i*), from the cosmos also to the infinite (b27–28), but cf. *Ph.* 3.5 and 3.8, which argue that an infinite body or place cannot exist. Stating an objection to his own doctrine, Aristotle here imagines the view of a philosopher claiming movement originated in an infinite expanse of matter surrounding our cosmos. Democritus B34 appeals to the microcosm-macrocosm analogy, but Cornford (1934, pp. 286–287 n. *b*) notes B34 may be inauthentic, and Zekl (p. 283 n. 25) compares Plato's *Timaeus* as an instance of the analogy, but the

original disorderly movement of the infinite has no beginning there, nor in Democritus. Alexander (fr. 561 Rashed) attributes the reference to the infinite exclusively to Anaxagoras (cf. DK B1, B3), explained by Rashed (pp. 505–506) as implicitly targeting his claim that movement had a first beginning (B12); Wagner (p. 672) attributes it less plausibly to Anaximander. Waterlow (1982, p. 220) notes that by using this analogy Aristotle anticipates his position in Ch. 6 that the cosmos as a single subject (or more precisely, a single primary body within, and partly determinative of, the cosmos) has one single everlasting movement. Thus it is not surprising that Aristotle seems to assume a microcosm-macrocosm analogy in all three objections. As Graham (1999, p. 61; cf. Simplicius 1187.15–18, 27–31) observes, he must, since otherwise each objection could be countered by asserting the cosmos comprises a continuous succession of overlapping but distinct movements without overall unity (not that Aristotle would wish to, although he has not yet said why).

The status of self-movers such as animals becomes a major theme of Bk 8 hereafter. After Aristotle's present reply to this objection, explaining how they start moving, the topic returns in Ch. 4 in the demonstration that everything moved has a mover, then Ch. 5 argues that all self-movers contain distinct moving and moved parts, such that the mover is intrinsically unmoved, and in Ch. 6 after repeating the account in Ch. 2 of how animals are not exclusively self-moved, Aristotle argues there must be an everlastingly completely unmoved first mover of the first everlastingly moved body of the cosmos, the sphere of the fixed stars.

The three present objections are thus central to the overall project of Bk 8, requiring Aristotle to explain, respectively, how movement can be everlasting, whether any, and what things, belong to each of the possible cases, intermittently moved, everlastingly moved and everlastingly at rest, and how self-movement occurs. The latter is crucially important because Plato's *Phaedrus*, *Laws* Bk 10 and *Timaeus* had identified everlasting self-moving soul as the first cause of all movement, something Aristotle's doctrine of a first unmoved mover in Bk 8 rejects.

Note on Part B, Replies to the Substantive Objections (252b28–253a21)

Aristotle replies to the objections in terms of their modality: the first denies, and so now he affirms, the possibility of everlasting change (252b28–253a2), foreshadowing the doctrine of continuous rotation in *Ph.* 8.6–9; the second proposes the possibility of the origination of movement from nothing, and so now

he denies this possibility (253a2–21) by presenting accounts of how movement originates, respectively in lifeless (253a2–7), and living (253a7–21), things.

Ch. 2, 252b28–253a2: (B.1) Reply to the Argument from Boundaries

Now the first of these points stated is correctly stated, that there is no movement that is the same forever and one in number into an opposite condition. This is perhaps necessary, if in fact it is not possible for the movement of one and the same thing to be always one and the same. I mean, for instance, whether there is one and the same sound, or always a different one, from one string that remains in the same condition and in movement. But nevertheless, whichever is the case, nothing prevents some movement being the same by being continuous,¹ and (so) everlasting. This will be clearer from what follows.

252b28
b30

b35
253a1

Analysis

The reply here is that everlasting change is possible (supplied: *contra* 252b9–10, b12 above in Part A), because (a) nothing prevents some movement being the same by being continuous, and so everlasting (252a35–253a1), since (a.i) rotation is continuous and unbounded by opposed endpoints (supplied: see further *Ph.* 8.6–9) – nevertheless (b) there is no movement the same forever and numerically one into an opposite condition (252b28–31), because (b.i) the movement of one and the same thing cannot be always one and the same (unless it is rotating) (252b31–33; cf. *Ph.* 8.7–8, 261a31–265a13), since (b.i.i), for instance, (the movement, and thus) the sound of a vibrating string is not one and the same, but a series of distinct ones (252b33–35).

Commentary

Aristotle argues, contrary to the model of finite changes, which have *termini*, that everlasting change is possible, because (notwithstanding the model) nothing prevents some other movement being the same by being continuous (252a35–253a1), as rotation will be shown to be (see *Ph.* 8.8–9), and so everlasting (cf. Wagner, p. 672). Nevertheless, in clarification (252b28–31), no movement into an opposite condition is the same forever and numerically one, because no movement of one and the same thing (except rotation) can always be one and the same (252b31–33; cf. *Ph.* 8.7–8, 261a31–265a13). Aristotle adds the

¹ I.e., not between opposites.

implied example that a string's vibration is not truly continuous, but a series of distinct movements and so sounds (252b33–35).

The latter is expressed as a question, but as Cornford (1934, p. 288 n. *b*) notes, *Ph.* 5.4, 227b21–228a1 specifies the conditions for a movement being one in substance and number as unity in its subject, form of change, and time taken, while *Ph.* 8.8 shows a vibration would not satisfy the latter (since there is a moment when one component movement of the string is complete, but the next *has* not yet begun). Themistius (213.28) apparently misunderstands Aristotle here as referring not to vibration but a string repeatedly struck, unless he infers to a repeating cause of vibration (given Aristotle's belief in a contemporaneous cause of movement).

Ch. 2, 253a2–7: (*B.2*) Reply on the Initiation of Movement in Lifeless Things

253a2 *But for something not in movement to be moved is not at all strange, if*
at one time what moves it from outside is there, and at another time not.
 a5 *Yet how this could be must be investigated, I mean such that the same*
thing at one time is moved, and at another not, by the same thing that
is capable of inciting movement. Someone saying this is puzzled about
nothing other than why some beings are not always at rest and others
always in movement.

Analysis

Aristotle answers the second objection, from movement beginning both in lifeless and living things (above, 252b12–28), that such cases do not support the claim that the whole cosmos's movement might have begun from rest (supplied): he argues here regarding lifeless things that (*a*) the reason movement in a resting body starts at some moment is that the external moving cause is sometimes present and sometimes not (253a2–3); but (*b*) an external moving cause of the whole cosmos cannot be sometimes present and sometimes not (supplied); while (*c*) we must investigate why the same body is sometimes moved by the same external cause and sometimes not (253a3–5), because (*c.i*) this question resolves into that why each thing in the cosmos is not either always in movement or always at rest (253a5–7).

Commentary

Aristotle turns the apparent counterexample to everlasting movement, lifeless things being moved after resting, into a question within his own project. He

asserts there must be an external moving cause acting only when present (253a2–3). Ultimately the objection is answered by the demonstration that an external moving cause of the whole cosmos is invariably present. Aristotle now proposes to investigate why the cause in other cases does not always operate (a3–5); he then indicates his strategic motive for this question (a5–7, here *c.i.*), that it resolves into the question of Ch. 3 following, why each thing is not either always in movement or always at rest.

The external moving cause has already been introduced in Ch. 1, 251a16, a23–b7 and 252a1–5, and was presupposed in the third objection above (Ch. 2, 252b20–22). Generally see *Ph.* 2.1: the external mover is there identified in both crafts (192b2), and nature (193b8–12), *contra* the dominant modern view adopted by Graham (1999, pp. xv–xvi, 60–61), and also in *Ph.* 2.3 (= *Metaph.* 5.2), 2.7, 3.3 and cf. *Metaph.* 1 and 12.2–5. It is the subject of *Ph.* 8.4–6 below.

Ch. 2, 253a7–21: (B.3) Reply on the Initiation of Movement in Living Things

But the third point would seem to contain the greatest puzzle, what happens in the case of living beings, when movement comes to be in them which previously was not. For an animal that previously was at rest there- 253a7
after walks, while nothing outside moves it, as it seems. But this is false. a10
For we always see some intrinsic part of the animal in movement. But the animal itself is not responsible for the movement of this—rather it is the surroundings perhaps. We say it moves itself not with every movement, but locomotion. So nothing prevents, and perhaps rather it is necessary, a15
that many movements come to be in the body caused by the surround- ings, and some of these move the mind or desire, and that then moves the whole body, as for instance happens during sleep. For when there is no movement of perception in them, but there is some movement, animals a20
wake up. In any case it will be clear about this too from what follows.

Introductory Note

This passage continues the reply to the second objection, concerning the beginning of movement both in lifeless and living things (above, 252b12–28), rejecting the claim that the case of living things supports the objection with evidence of movement beginning from nothing.

Analysis

Before replying Aristotle acknowledges (*a*) the explanation of an animal initiating movement is the greatest difficulty (253a7–9), since (*a.i*) it seems that after previously being at rest it walks while nothing external moves it (253a9–11) – then he states (*b*) that nevertheless something external causes the movement (253a11), since (*b.i*) movement is perceptible within the animal before its locomotion starts (253a11–12); and (*b.ii*) the environment causes many such internal movements (253a12–13, a15–17), because (*b.ii.i*) in talking about an animal moving itself we refer only to locomotion (253a14–15); but (*b.ii.ii*) the environment causes internal movements of other kinds (supplied) – while (*b.iii*) some of these move the animal's thought or desire, which then moves the whole body, as happens during sleep (253a17–19), since (*b.iii.i*) not perception, but some other internal movement, awakens animals (253a19–20; cf. *Ph.* 8.6, 259b1–16 below, *De somno* 3, 458a10–25, *Insomn.* 3).

Commentary

This section of the chapter has provoked most philosophical interest on several grounds: *Ph.* 8.6, 259b1–16 elaborates its content, but there is still dispute about what the two passages claim; again, the explanation of animal self-motion is an intrinsically important issue, compounded by the question how Aristotle's doctrine is related to Plato's theory of the self-moving soul, and divergence between medieval interpretation, whereby Aristotle actually denies self-movement to animals (see, e.g., King, pp. 227–228 and 231–238), and modern views defending its integrity for him: cf. e.g. Nussbaum (Essays 2 and 5), Furley (1994/1978), and other contributors to Gill and Lennox (1994); see, contra, Sorabji (1980, p. 229). Furthermore the analysis of self-movers into distinct motive and moved parts in Ch. 5, 257a31–258b4 is crucial to Aristotle's argument for an unmoved cosmic prime mover, and several prominent modern scholars follow to differing degrees Simplicius' Neoplatonic view that the latter is part of a self-moving whole. See the *Commentary* on Ch. 5 below for why this view must be rejected.

Here Aristotle explains that external factors (e.g., food, temperature) affect the body (through digestion: see *Ph.* 8.6, 259b11–15, or chilling), causing the animal to awaken, enabling its perception or thought, imagination and desire to move it (cf. *de An.* 3.10). Kosman (1994b, pp. 69–70) argues that, although Aristotle says animal self-movement occurs only under such conditions, and at 259b7 that consequently animals do not move themselves completely independently (*κυρίως*, *kuriōs*), nevertheless he doesn't deny they are self-movers when they do act on desire; Furley (1994/1978, pp. 7–14), proceeding primarily by considering other texts, implies the same.

Notes

Both Simplicius (1190.24–27) and Aquinas (8.1002) comment on the word ‘perhaps’ (ἴσως, Lat. *forsitan* 253a13, a15) qualifying the key premiss, here *b.ii*, that the environment works on the animal: both commentators suggest Aristotle might have in mind the alternative that some non-self-movements in an animal are internally generated. Simplicius also proposes that otherwise this is because he has not proven his claim, but neither commentator doubts his commitment to the premiss.

Meyer (p. 73 n. 12) denies that at 253a14–15, here *b.ii.i*, Aristotle holds the view that animal self-movement is exclusively locomotion, since the current argument is merely *ad hominem*, given the objection that animal locomotion is *ex nihilo*. This seems implausible, overlooking Aristotle’s reliance in *Ph.* 8.4, 255a7–10 on the elements’ inability to stop their movement to justify denying they engage in self-movement, explained by walking, and the ability to reverse direction. Growth, nutrition and respiration, which Meyer includes in self-movement, fail to meet this criterion.

Redefined Inquiry into Movement and Rest

Introduction to Chapter 3

Part *A* of Ch. 3 (253a22–32) is very brief: Aristotle broadens the inquiry of Chs. 1–2 from whether movement is everlasting, now to ask generally, what kinds of beings there are, in terms of those possibly either sometimes or always in movement, and correspondingly at rest (253a24–30). He first foreshadows a solution to other problems (253a22–24, cf. a30–32), from an explanation why there are beings sometimes in movement and at other times at rest.

The second and third objections and their solutions in the previous chapter presupposed such beings (that is, ordinary natural beings, both lifeless and living), but it was unresolved exactly why they are sometimes in movement and at others not. Part *B*, taking up most of the present chapter (253a32–254b6), now shows these constitute the first of the three possible kinds of beings. In other words, before explaining *why* some beings are only intermittently in movement, Aristotle has first to establish *that* this is so, the main task of the present chapter. Thereafter he will confirm in Ch. 6 both the other two kinds, those everlastingly in movement and those everlastingly at rest, respectively an everlastingly mobile heavenly sphere and its everlasting unmoved mover; thereby Aristotle also offers a cosmological explanation of those with only intermittent movement: see especially 260a14–16, and cf. Lang (1998, pp. 211 and 253), and Waterlow (1982, pp. 223, 226), who points out that Aristotle's aim is to explain variation in general, not just starting and ceasing to change.

Ch. 3, 253a22–24, a30–32: (*A.1*) Definition of the Subsequent Inquiry

3, 253a22

a25

The beginning of our investigation is just that which also addresses the difficulty previously discussed, why some beings are sometimes in movement and at other times at rest again. For either everything must be always at rest, or everything must be always in movement, or some things in movement and other things at rest; and in the latter case again, either the things in movement must be always in movement, and those at rest always at rest, or everything is of a kind naturally to undergo both movement and rest in a similar way, or there is again also a third possibility left. For it is possible that some beings are always motionless, others always in

movement, and yet others participate in both conditions. And the latter is just what we should say. For this encompasses the solution to all the difficulties involved, and is the goal we have for this project. a30

Introductory Note

This passage intertwines both (A.1) a specification of the overall goal of *Ph.* 8's project (253a22–24 and a30–32), to solve certain problems, and (A.2) a statement of the reformulated guiding question that will solve them (a24–30), foreshadowing the solution to be defended (a30). The second topic will be discussed separately below, but the whole passage is presented here for convenience.

Analysis

In 253a22–24 and a30–32 Aristotle makes or implies three independent related points:

- (A.1.1) that the project's goal involves solving all outstanding problems (253a30–32);
- (A.1.2) that the outstanding problems include (supplied):
 - (A.1.2.1) why some beings are sometimes in movement and at other times at rest (252a23–24; cf. *Ph.* 8.2, 253a5–7);
 - (A.1.2.2) how there can be everlasting movement (supplied: cf. *Ph.* 8.2, 252b35–253a1); and
 - (A.1.2.3) how animals apparently move themselves (supplied: cf. *Ph.* 8.2, 253a20–21);
- and (A.1.3), that the inquiry's starting point (see Section A.2 below) is that which solves the first problem (i.e. A.1.2.1; 253a22–23).

Commentary

Aristotle refers to the first of these problems (A.1.2.1) explicitly at 253a23–24, and the second and third are those others left unsolved in Aristotle's replies to the objections in Ch. 2. At a22–23 he states that the starting point of the inquiry will solve the first: that is, it will explain the causes of intermittent terrestrial movement. Next he introduces this new starting point, the analysis of all possible dispositions of movement and rest in the cosmos (a24–30), in order to establish which is the case, and he foreshadows his answer (a30): for all this see Section A.2 below.

Simplicius (1193.8–9, cf. 3–5) understands “our investigation” in the first line of Ch. 3 (253a22, τῆς σχέψεως, here A.1.3) to refer just to what was promised at the end of Ch. 2 (253a20–21), the explanation of apparent animal self-move-

ment; so he takes Aristotle to claim that the starting point for the latter is the same as that for solving the problem he explicitly mentions (253a23–24), why some things start and stop moving. Partly similarly Themistius (214.26–29, cf. 3–8) takes τῆς σκέψεως to refer to the explanation of both animal and non-living limited movements. But the expression “what follows” in Ch. 2 (253a21) suggests to modern scholars a more general refounding of the preceding inquiry into the everlastingness of movement on more comprehensive principles than those so far adduced, so that τῆς σκέψεως refers to this re-conceived inquiry as a whole (see the *Introduction* to Ch. 3, p. 52 above). Accordingly, Aristotle here foreshadows the aims of the rest of the book, beginning from the one particular problem from Ch. 2 (253a22–23). By contrast Seeck (pp. 135–137) claims the inquiry referred to in 253a24–30, discussed in Section A.2 following, is introduced as if the transition between rest and movement is unproblematic, although admitting the chapter starts with that problem; consequently Seeck (pp. 135–143) argues that Chs. 3–6 pursue incoherently two distinct projects, the solution to the problem of the cause of transition from rest to movement, and the cosmic inquiry into dispositions of movement and rest, and he attempts to show that references to the latter are later additions to the text. Scholars do not generally accept Seeck’s position, but see below (ad loc.) on the passages on which he focuses.

Ross (p. 691) notes that Ch. 3 first shows *that* some things are sometimes in movement then Chs. 4–5 give the explanation; cf. 253a23–24, here A.1.2.1. He specifies the problems Aristotle promises to solve (253a30–32) as only two, firstly, how there can be a single everlasting movement (i.e., one not between fixed endpoints), and, secondly, how the required first mover is consistent with everlasting movement; hence the solution to the latter is what Aristotle calls “the goal of the project”, that of providing a “complete cosmology” (in Ross’s words). The *Analysis* above, listing three problems, differs from Ross’s account of a second problem and solution, because, so far, the reference to outstanding problems (πάντων τῶν ἀπορουμένων, 253a31, here A.1.1), is only explicable by reference to those already raised but not yet solved here, that is, in Aristotle’s responses to the objections in Ch. 2. On Graham’s view see Section A.2, 253a24–30, next below.

Verbeke (pp. 151–152) argues that, since the question whether there is movement at all was disposed of in Ch. 1 (250b15–23), it is peculiar that it is reopened in Ch. 3, without reference to the earlier treatment. He proposes this as evidence that Chs. 1–2 were originally separate and later integrated into Bk 8. He finds further evidence in the fact that the initial questions in Ch. 3 (253a22–24), linking it back to Ch. 2, are not thereafter mentioned, but replaced with the investigation of the cosmic disposition of movement and rest (253a24–30)

and the question thereafter how cosmic movement originates. But I believe all this is adequately explained by Aristotle's reformulating the project with the questions that his answers to Ch. 2's objections raise, which put the result of Ch. 1 in doubt.

Ch. 3, 253a24–30: (A.2) The Reformulated Question

Here I re-present Aristotle's analysis of possible dispositions of rest and movement from the previous passage. Deciding which among these is the case is the guiding question that will enable solution of the difficulties discussed above.

For either everything must be always at rest, or everything must be always in movement, or some things in movement and other things at rest; and in the latter case again, either the things in movement must be always in movement, and those at rest always at rest, or everything is of such a nature as to undergo both movement and rest in a similar way, or there is again also a third possibility left. For it is possible that some beings are always motionless, others always in movement, and yet others participate in both conditions. And the latter is just what we should say.

Analysis and Commentary

In Aristotle's own analysis here, repeated at 254a18–22, he distinguishes the possibilities:

- (i) everything must always be at rest (253a24: the view of Parmenides and Zeno of Elea, and Melissus; the Neoplatonist Simplicius 1195.13–15, for whom these are in agreement with Aristotle and Plato, explicitly denies this identification);
- (ii) everything must always be in movement (253a24–25: the view of the atomists Leucippus and Democritus of Abdera, and, on Aristotle's interpretation, of Heraclitus of Ephesus; see *Cael.* 3.1, 298b29–33, and Graham, 1999, pp. 66–67 for further discussion and references);
- (iii) at any time some things are in movement and others at rest (253a25), either:
 - (iii.α') some things always in movement and others always at rest (253a26–27: as asserted in several Platonic dialogues, e.g. *Timaeus* 27d–28a, contrasting intelligible forms and perceptible bodies), or

- (*iii.β'*) everything alternates between movement and rest (253a27–28: on Aristotle's report, e.g. in Ch. 1, the view of both Empedocles and Anaxagoras), or finally
- (*iii.γ'*) some things are always in movement, others always at rest and yet others alternate between movement and rest (253a28–30: Aristotle's own view, repeated 254b6).

The remainder of Ch. 3 will reject all possibilities except *iii.β'* and *iii.γ'*. Aristotle first argues against (*i*) universal immobility (253a32–b6, 254a23–33) and (*ii*) universal movement (253b6–254a3); then he excludes the possibility (*iii.α'*) that all beings are each either everlastingly in movement or immobile, arguing positively for the existence of beings only intermittently in movement (254a3–15). This leaves for later chapters the decision whether (*iii.β'*) these are the only beings, or (*iii.γ'*) there are also some everlastingly in movement and others everlastingly at rest.

Simplicius (1193.14–20) apparently first replicates the principle of division accurately, but then (1193.20–24, cf. 1202.36–1203.7), in explaining Aristotle's identification of *iii.γ'* as 'third', he clearly miscounts *i* and *ii* together as one; cf. Share (trans. of Simplicius, p. 95 with n. 289). See rather Alexander (fr. 563 Rashed), Themistius (214.30–215.6), Philoponus (825.15–17) and Aquinas (8.1005), who rightly identify *iii.γ'* as third within the trichotomy of ways there might be both movement and rest. Verbeke (pp. 149–151) notes that Aristotle omits three further possibilities, (**iii.δ'*) that everything *together* alternates between periods of movement and rest, (**iii.ε'*) that some things alternate, others are always in movement, and nothing is permanently at rest, and (**iii.ζ'*) that some things alternate, others are always at rest and nothing is permanently in movement; cf. Simplicius (1194.1–17), introducing an alternative principle of division producing all but **iii.δ'*; the resulting co-incidence with Abū l-Faraj (830.12–831.2, cited by Lettinck, p. 566) and Ibn Rushd (*LC* 356C12–F9, cited by Lettinck, p. 643; cf. p. 599 n. 1 and p. 643 n. 3) suggests this is originally Alexander's. Verbeke explains that **iii.δ'* corresponds with Empedocles' view, already rejected, while **iii.ε'* and **iii.ζ'* are implicitly disproven insofar as Ch. 6 establishes that *iii.γ'* is the case.

Graham (1999, pp. 73–74) observes that this passage creates an expectation that after Ch. 3 Aristotle should immediately defend *iii.γ'* against *iii.β'* (that there is nothing either everlastingly in movement or rest), whereas in Ch. 4 he discusses the moving causes of things subject to both movement and rest, and only in Chs. 5–6 demonstrates there are also things everlastingly in movement and at rest. But Graham (loc. cit.) is wrong to claim Ch. 4 "has no obvious connection to the debate between the two remaining alternatives": the alterna-

tives are distinguished at 253a24–30 in order to address the question raised at the beginning of Ch. 3 (253a23–24), why some beings are sometimes in movement and sometimes not; thus Ch. 4, establishing there is an immediate cause of every movement, is a necessary step toward answering this. Showing that something undergoes everlasting movement and has a motionless cause both decides among the remaining alternatives and provides the ultimate answer to Ch. 3's initial question. Cf. Aquinas (8.1004), although note he assumes that *Ph.* 7 has already proven there is a first mover, and *Ph.* 8 is primarily about its nature.

Note

Seeck (pp. 140–142) claims the lines 253a25 [xαi]–32 here (and again subsequently 254a19–22) containing the subordinate subdivision producing *iii.α'*, *iii.β'* and *iii.γ'* are two later insertions, not aimed at solving the initial problem why some things alternate between rest and movement, but categorising nature into three cosmic kinds. He argues that this subdivision is unanticipated during the divisions between *i*, *ii* and *iii* (253a24–25 and 254a18–19), represents an advance on Ch. 2 and is not stated the same way in Ch. 6, 260a12–14. Seeck's hypothesis seems unlikely, since the division in Ch. 6 enables the causal problem to be solved so as to confirm *iii.γ'*. Seeck nevertheless notes the only other places in Ch. 3 where the claim is made that some things alternate between movement and rest are at 254a15–16 and b4–6, regarding these passages also as insertions. But this argument verges on a *petitio principii*, since without prior assurance that there was originally no categorisation in Ch. 3, which these passages contradict, we would have no reason to reject them. See further on Seeck's rejection of corresponding passages in Ch. 6.

Note on (B.1) the Rejection of (i) Universal Immobility (253a32–b6 & 254a23–33)

After analysing the possibilities for movement and rest in the cosmos in Part A of Ch. 3, Aristotle rejects three in the remainder (Part B). Section B.1.I argues against (i) universal immobility (253a32–b6), Section B.2 rejects (ii) universal movement (253b6–254a3), then Section B.3 demonstrates that some beings are alternately in movement and at rest (254a3–15), excluding the possibility (*iii.α'*) that all beings are each either everlastingly in movement or at rest. The only remaining possibilities then are (*iii.β'*) that all beings are intermittently moved and at rest, and (*iii.γ'*) that in addition to the former there are also beings everlastingly moved and everlastingly at rest. This leads to the repeated statement of the range of possibilities, as the guiding question (254a15–22), fol-

lowing which Aristotle announces explicitly a return to the rejection of universal immobility (254a23–33), partially overlapping the first passage: accordingly I take the latter passage, divided below into two further subsections, a23–30 (*B.1.II*), and a30–33 (*B.1.2*), contrary to the order of the text, immediately after *B.1.I*, which follows here immediately. (For the *ad hoc* numbering of *B.1.2* see the *Analysis*, p. 62, and cf. p. 59.) Seeck (p. 137 n. 1; cf. p. 169) calls the second passage (*B.1.2*) a doublet of the first, but they are not so closely related: the arguments are essentially distinct, as the *Commentary* shows. A summary of results ends the chapter (254a33–b6).

Ch. 3, 253a32–b6: (*B.1.I*) Charge of Intellectual Weakness Against Supporters of *i*

253a32 *Now the position that everything is at rest, and to search for an argument for this, ignoring perception, is a kind of intellectual weakness, and*
 a35 *a dispute in effect about a whole subject, not some part of it; and not*
 253b1 *just with the physicist, but with all kinds of knowledge, effectively, and all*
 beliefs, since they all deal with movement. Moreover just as in discussions
 of mathematics objections about the principles are of no interest to the
 mathematician, and similarly too in all other cases, so also those about
 b5 *the present subject are of no interest to the physicist. For his presupposition is that nature is a source of movement.*

Introductory Note

Aristotle argues here that all beings are not always at rest (254a1–2, a23–24; cf. 253a32–35, *Ph.* 1.2, 184b25–185a20 and 1.3, 186a16–18) with two separate arguments: Argument *I*, from the intellectual weakness of denying movement (demonstrated in 253a34–b6, and by a further argument in the second passage, below at 254a30–33), concludes in support (*I.a*) that to seek to argue otherwise in defiance of perception is intellectual weakness (253a32–34)—while Argument *II*, a dialectical defence of movement, is based on the fact that beliefs are movements, in the next passage (*B.1.II*, 254a23–30).

Analysis

The charge (*I.a*) that to deny all movement is intellectual weakness (253a32–34), is supported by two further sub-arguments: the first (*I.a.I*) from the obliteration of knowledge and belief supports the claim (*I.a.I.i*) that to dispute whether any movement occurs aims to obliterate knowledge or belief (supplied), with two further reasons (*I.a.I.i.I*, as anti-disciplinary; and *I.a.I.i.II* as

too general), because (*I.a.I.i.i.i*) it disputes with them as whole disciplines, and not just with some part's particular doctrine (253a34–35) – and (*I.a.I.i.II.i*) it disputes with them all, not just the knowledge of nature (253a35–b1), since (*I.a.I.i.II.i.i*) they all appeal to movement (253b1–2).

The general charge of intellectual weakness is also supported by Sub-argument *I.a.II*, claiming (*I.a.II.i*) that disputing whether movement occurs is methodologically confused (supplied), since (*I.a.II.i.i*) it presupposes that physicists ought to defend this assumption (supplied); but (*I.a.II.i.i.i*) they need not do so (supplied: cf. *Ph.* 1.2, 184b25–185a17), for two further reasons, concerning (*I.a.II.i.i.I*) the treatment of principles (253b2–6); and (*I.a.II.i.i.II*) the indemonstrable epistemic status of principles (254a30–33, for which see the passage *B.1.2*, pp. 62–63 below).

The claim (*I.a.II.i.i*) that physicists need not defend their assumption that movement occurs, follows by Argument *I.a.II.i.i.I*, from the treatment of principles (253b2–6), because ([numbering abbreviated] ... *I.i*) in physics it is presupposed that nature is a principle of movement (253b4–6; cf. *Ph.* 2.1, esp. 192b20–23); but (... *I.ii*) disputing generally about the principles of their discipline is not the physicist's concern (253b4–6), since (... *I.ii.i*) practicing scientists do not do this (253b2–4), as (... *I.ii.i.i*), for instance, mathematicians do not (253b2–4); yet (... *I.ii.i.ii*) mathematicians are exemplary scientists (supplied).

Commentary

Sub-argument *I.a.II* defends the study of movement as an essential aspect of physics, arguing that movement must be presupposed, since the definition of nature involves movement (253b4–6, here ... *I.i*); see, e.g., Lang (1998, p. 51) for the range of Aristotle's appeals to this definition. Thus Argument *I.a.I* differs from *I.a.II* in charging that the opponent, although making claims about nature, undermines the possibility of knowledge, while Argument *I.a.II* claims the physicist is entitled to assume that movement occurs, and the opponent is confused about how scientists ought to proceed. Both *I.a.I* and *I.a.II* support *B.1.I*; regarding *B.1.II*, the dialectical defence of movement, see below on 254a23–30.

Simplicius (1194.32–1195.22) identifies in the first passage (253a32–b6) four independent arguments against universal immobility, the first (253a32–34) corresponding with the main Premiss *I.a* here, the second (a34–35) is here *I.a.I.i.I*, the third (a35–b2) is here *I.a.I.i.II* and the fourth (b2–6) is here *I.a.II.i.i.I*, but he does not discuss their inter-relations or the second passage. No justificatory particle such as γάρ makes explicit the chain of subordination given here, but I understand καί (253a34), introducing *I.a.I.i.I.i*, as epexegetic; the ground for the subordination of the other arguments as justifying the first claim is that

the authority of perception is not automatic or universal for Aristotle: it is a reasoned title, topic by topic, since the *phainomena*, including what is strictly perceptible, are often somewhat inconsistent and on each topic need sorting out; in particular, even to see that movement *is* a special kind of case requires reasoning: that it is the whole subject of a science, and moreover presupposed by others.

Philoponus (825.1–14) and Aquinas (8.1006) identify here only three arguments, excluding Simplicius' second. Defending the first, Aquinas appeals to *Topics* 1.11, 105a3–9 (which states there is no need to argue against sophistic positions denying perception), but regarding his next (253a35–b2, here *I.a.I.i.II*), he rightly allows that although it is not the physicist's business to refute errors about all beings and kinds of knowledge, it is a metaphysician's. Accordingly, Aristotle's conceptually reflexive progress in the *Physics* should be called 'philosophy of nature', not just 'physics', although note he distinguishes this nevertheless from 'first philosophy', or 'theology', by its different subject matter.

Note

Wieland (14 n. 2) claims the argument at 253a35–b2, here *I.a.I.i.II*, that denying movement obliterates all knowledge because all kinds of knowledge appeal to movement, shows that this text is from early in Aristotle's career, since it assumes there is no separate metaphysical knowledge of the unmoved mover (i.e., knowledge which does not appeal to movement). To avoid the latter implication, Alexander (fr. 565 Rashed) and Simplicius (1195.6–11, corr. Rashed, p. 509), interpret ὡς ἐπείν ('effectively', 253b1) as conceding an exception. But other explanations are possible, for instance, that 'first philosophy' necessarily involves knowledge both of changing and unchanging kinds of beings (compare the analysis of matter and form in *Metaph.* 7–8, and the division of kinds of substance in *Metaph.* 12.1, with 12.2–6).

Ch. 3, 254a23–30: (*B.1.II*) Dialectical Argument Against (*i*) Universal Immobility

For convenience I take this and the following passages out of order with 253a32–b6 (immediately above): see the preceding *Note on (B.1) the rejection of (i) universal immobility* (253a32–b6 & 254a23–33) (pp. 57–58).

254a23

Well then, it has actually been stated previously that it is not possible for everything to be at rest, but let us also state it now. For if the situation

is actually in truth just the way some people say, that what there is is unlimited and motionless,¹ nevertheless it certainly does not appear so in perception, but rather, that many beings are in movement. Then if indeed this is a false belief, or at all a belief, there is actually movement, both if it is an apparition (φαντασία) and also if it seems sometimes so and sometimes otherwise; for an apparition and a belief (δόξα) seem to be kinds of movement.

Analysis

Aristotle here first indicates a return to the topic of universal immobility already discussed at 253a32–b6, restating the conclusion that movement must occur (254a23–24, cf. 253a32–35, 254a1–2 and *Ph.* 1.3, 186a16–18), but he now introduces a dialectical Argument *II* confirming it is impossible that no movement occur at all (254a24–30). The argument starts from the opponent's admission (*II.a*) that perception, at least, occurs of many beings in movement (254a25–27); while (*II.b*) most people believe this perception (supplied); but (*II.c*) apparitions (such as apparent perceptions) and beliefs themselves are agreed to be kinds of movement (254a29–30), since (*II.c.i*) apparitions are psychic movements (supplied: cf. *de An.* 3.3, 428b11, 429a1–2); and (*II.c.ii*) beliefs are either apparitions, or in any case themselves may change (254a27–29).

Commentary

Alexander (ap. Simplicius 1203.36–1204.1), with the hindsight of Stoic epistemology, explained the relation between the key terms in this argument by defining an apparition as the result of perception, and a belief as a concordance (συγκατάθεσις) with an apparition; but see 254a27–29, here *II.c.ii*, where Aristotle suggests beliefs may themselves be apparitions. *Contra* Graham (1999, p. 72) Aristotle here explicitly distinguishes a belief in change (*ex hypothesi* “an apparition”) from changing beliefs (“it seems sometimes so and sometimes otherwise”), arguing that both involve movement. Philoponus (828.11–34) finds three distinct arguments here, one from change in us involved in belief and apparition; a second from the fact that an opponent trying to persuade us there is no movement is trying to change our mind; and a third that belief and apparition depend on perception involving movement.

¹ The view of Melissus (see e.g., *Ph.* 1.2, 184b15–16, 185a32–b5, cf. b16–17).

Note

Simplicius (1204.9–31) is bothered by Aristotle's words at 254a27, in *II.c.ii* here, "if there is false belief, or belief at all, there is indeed movement" and constructs a distinct argument to explain the reference to falsity (briefly, if there is no movement, the belief in it is false, therefore there is non-being, and so void, and so movement), but without foundation in the text. But characterising belief in change as false is merely a way of acknowledging the opponent's position that enables Aristotle to elicit the admission that there is belief (supplied as *II.b* in the *Analysis* above); cf. similarly Wieland (p. 222).

Ch. 3, 254a30–33: (*B.1.2*) Argument from the Status of Principles, *Contra i*

254a30

But to engage in an investigation of this, and seek an account of something regarding which we are in a better situation than to need an account, is to be a poor judge of what is better and worse, reliable and unreliable, and a principle and not a principle.

Analysis

This is a second brief argument ultimately in support of *I.a.II* in the *Analysis* of passage *B.1.I* above, the charge of intellectual weakness against those denying movement occurs, on the basis that they are methodologically confused (see 253b2–6, and esp. pp. 57–59). On the analysis there Aristotle implies (*I.a.II.i.i*) that those denying movement presuppose physicists ought to defend their admission that movement occurs (supplied); but that (*I.a.II.i.ii*) they need not do so (supplied; cf. *Ph.* 1.2, 184b25–185a17), supported above by Argument *I.a.II.i.ii.I* concerning the treatment of principles (253b2–6); Aristotle now presents a second extremely brief Argument *I.a.II.i.ii.II*, from the epistemic status of the principles of a science (i.e. *B.1.2* = 254a30–33 = *B.1.I.a.II.i.ii.II*): this implies as a reason why they need not defend the postulation of movement, ([abbreviated] ... *II.i*) that principles cannot be demonstrated from anything else (supplied: cf. *Ph.* 2.1, 193a4–9, and 8.1, 252b4–5), because (... *II.i.i*) principles are better known and more reliable than what follows from them (254a30–33) – but (... *II.ii*) it is presupposed in physics that nature is a principle of movement (supplied: cf. 253b4–6).

Commentary

Here the principle appealed to in physics is the subject matter of the science (nature, *physis*), whose definition in *Ph.* 2.1 refers to movement: "nature is a

principle and cause of being moved and of resting in that to which it primarily, that is intrinsically and not incidentally, belongs" (192b21–23). For Aristotle, this shows, a principle (*ἀρχή*, *archē*) is not primarily conceptual, but a specified explanatory factor in the subject, responsible for it (and thus he calls nature an *αἰτία*, *aitia*, or cause, 192b21). This is generally consistent with Aristotle's theoretical treatment of knowledge of principles in the *Prior* and *Posterior Analytics*, in *Nicomachean Ethics* Bk 6, and above, Ch. 1, 251b32–b5. Philoponus (828.35–829.4) overlooks the reference to principles (254a33), treating the argument as generally from the reliability of what is obvious.

Ch. 3, 253b6–13: (B.2.1) Rejection of (ii) Universal Movement, Introduction

In effect, while it is false, too, to say that everything is in movement, it is less contrary to the discipline than in the previous case. For while nature is taken to be a source of rest no less than of movement in natural things,² nevertheless movement is a natural phenomenon. And some people say not that some things are in movement and others not, but that everything always is, although our perception does not detect this.³ It is not difficult to answer these people, despite the fact that they do not define clearly what kind of movement they mean, or whether all kinds.

Analysis

Here Aristotle surveys briefly the position to be refuted (see 253b13–254a3), making four main claims, (a) that those saying everything is always in movement also at least partly reject physics (253b6–7, b9–10), because (a.i) nature is a principle of both movement and rest (253b7–9; cf. *Ph.* 2.1, esp. 192b21–23); but (a.ii) they deny all rest in nature (supplied), since (a.ii.i) they assert we cannot perceive the constant movement (253b11) – yet (b) they reject physics to a lesser extent than those who deny all movement (253b7, cf. 253a32–b6 immediately preceding), because (b.i) by admitting movement they admit the subject of nature (supplied), given (b.i.i) that movement is a natural phenomenon (253b9;

2 See *Ph.* 2.1, 192b21–23, cited immediately above. Graham (1999) translates ἐν τοῖς φυσικοῖς (253b8) as “in the *Physics*” (and similarly Wicksteed, and Wagner, p. 673), but the phrase seems to have the same role as ἐν ᾧ ὑπάρχει πρῶτως καθ’ αὐτὸ καὶ μὴ κατὰ συμβεβηχός (192b22–23)—nature is not a principle of movement or rest in craft products, as such.

3 See Graham (1999, pp. 66–67) for discussion of whether and how far Aristotle attributed this view to Heraclitus, with references.

cf. *Ph.* 1.2, 185a12–14) – and while (c) these people do not specify whether they mean all beings are always in every kind of movement, or if not, which kind (253b12); nevertheless (d) it is not difficult to answer them (253b11–13).

Commentary

Simplicius (1195.35–1196.8) and Aquinas (8.1007) offer further reasons for 253b7, here *b*, the claim that the doctrine of universal movement is less opposed to physics than that of universal rest, that go beyond Aristotle's text, namely (**b.II.i*) that denying movement also denies rest, because (**b.II.i*) rest is by definition a privation of movement – whereas (**b.II.ii*) those denying only rest deny nature less completely than the former (cf. also Alexander fr. 566 Rashed, and Philoponus 826.3–5) – again, (**b.III*) that some beings in fact are always in movement but nothing *natural* is always at rest; and (**b.IV*) that it is less controversial to claim that some movements are imperceptible than that perception of movement as a whole is false.

Aristotle continues in what follows, arguing in turn that nothing can grow or shrink continuously (253b13–23), that alteration is not continuous (253b23–31), and everything is not always in locomotion (253b31–254a1), together implying his general conclusion rejecting universal movement (254a1–3). Simplicius (1196.13–20) observes that Aristotle's strategy here is based on his criticism (253b12, here *c*) that proponents of universal movement do not specify which kind they mean; accordingly he takes each kind and shows it has limits. Alexander (fr. 567 Rashed) calls Democritus the target, but this criticism is not justified against the atomists, who reduced all change to atomic locomotion: perhaps Aristotle is thinking mainly of Heracliteans (cf. Simplicius 1196.8–10).

The argumentative strategy is (*B.2*) that all beings are not always in movement (253b6–7, 254a1–3, a33–34), because (*B.2.a*) there is no kind of movement in which all beings participate always. (Aristotle overlooks the possibility that each being always participates in some kind of movement, but not in every case in the same kind; and note *B.2* above cannot be replaced with (**B.2*) "All forms of movement involve rest", since this is not true of celestial rotation.)

B.2.a is supported by Aristotle's general doctrine (*B.2.a.i*) that the only kinds of movement are growth and shrinkage, alteration and locomotion (cf. *Ph.* 5.1–2, 225b5–226b10), and the result of what follows, (*B.2.a.ii*) that rest occurs for each kind of movement. Aristotle here omits generation and destruction from movement, but includes them subsequently in refuting possibility (*iii.α'*) that all beings are either always at rest or always in movement (see below 254a10–11). Elsewhere too he treats movement (*kinēsis*) as equivalent to the wider term change (*metabolē*), which includes generation and destruction (with *Ph.* 5.1–2, 225a12–b11, cf. e.g. *Ph.* 3.1, 200b33–201a9, and *Metaph.* 12.2, 1069b10–14).

Ch. 3, 253b13–23: (B.2.2) Rejection of Continuous Growth & Shrinkage, *Contra ii*

For it is not possible either to grow or to shrink away continuously, but there is also the midpoint in each case. And the explanation is similar to that of dripping wearing rocks away, and plant growth breaking them apart. For it is not the case that if the dripping displaces or removes a certain amount, it will previously remove half in half the time. Rather, like people hauling ships, here too, this many drips move this much, but some part of them will not move so much in any time. So while what is removed is divisible into very many parts, none of them is moved separately, but only altogether. So clearly it is not necessary that something is always disappearing, just because the shrinking is infinitely divisible, but rather it disappears as a whole at some time.

Introductory Note

Initially here, by a midpoint (τὸ μέσον, 253b14) Aristotle must mean either where growth is complete, before shrinking begins, or else a break during growth or shrinkage, before a point is reached precipitating further change, as in the following examples. If the former, there is a separate argument from natural limits, and at b14 δ(έ) ('And') introduces a second argument from the minimum force required to cause change (b14–23). For this view see Cornford (1934, p. 295 n. g), Simplicius (1196.20–27), Philoponus (826.6–11, 883.29–31) and Themistius (215.18–22). Ross (p. 433, but cf. p. 692), Graham (1999, p. 67) and Aquinas (8.1008) adopt the latter (a break during change), implying there is only one argument. Against this is the fact that Aristotle makes no mention of growth, as opposed to shrinkage, occurring by degrees, while 253b15–16 suggests rootgrowth *is* continuous. Simplicius (1196.27–1197.9) explains the latter argument as directed specifically against the claim that the continuity of movement is imperceptible in some cases, which could be defended by appealing to the putative necessity of continuous wearing away or cracking of a rock under the influence respectively of water or rootgrowth, since the latter are continuously at work.

Analysis and Commentary

Assuming that there are two arguments, Argument *I* from natural limits is explicable as that growth and shrinkage do not continuously alternate, since (*I.a*) there is a midpoint (253b14), because (*I.a.i*) growth ceases before shrinkage begins (supplied); and (*I.a.ii*) unless destruction occurs, shrinkage ceases before growth restarts (supplied).

Argument *II* from a minimum force required for change (253b14–23) involves a general claim, (*II.a*) that while what shrinkage removes is infinitely divisible, the parts are removed discontinuously in minimum quantities (b19–23), supported by two examples, (*II.a.i*) that, for instance, a number of drips wears away an amount of rock, but fewer will not wear away any (b14–19); and (*II.a.ii*) that an amount of rootgrowth will dislodge an amount of rock, but less will not dislodge any (b15–16). Example (*II.a.i*), pursued most explicitly here, is further supported, by the comparison (*II.a.i.i*) “like people hauling ships” (b18–19), referring to the fact, discussed in *Ph.* 7.5, 250a9–25, that despite a number of men being able to haul a ship a given distance in a given time, one man will not be able to haul it any distance in any time. This does not exemplify growth, and only demonstrates a general principle, of the minimum force required for certain kinds of change, owing to the resistance (‘force’, *ischus*, in Aristotle’s terminology) of the subject. Thus this is an argument by analogy and, to apply it in the case of shrinkage, we must take it (*II.a.i.ii*) that the opposing ‘force’ of the agent of change accumulates over time to reach the minimum quantity necessary to have an effect. Simplicius (1198.37–1199.2) imagines this occurring by gradual weakening of, e.g., the rock under the continuous action of waterdrops or root pressure, until it reaches breaking point. On the possibility that Aristotle thinks that the change is then instantaneous, see the *Commentary* below on alteration (253b26–30, pp. 67–68).

**Ch. 3, 253b23–31: (B.2.3) Rejection of Continuous Alteration,
*Contra ii***

253b23 *It is also similar in the case of any kind of alteration. For an alteration*
 is not infinitely separable into parts just because what is being altered is
 a25 *so, but rather, often it happens all together, as for instance freezing does.*
 Moreover when something has become ill, a period of time must transpire
 in which it will be healed, and it cannot change at the limit of the time;
 and it must change to health and not to anything else. As a result, to say
 b30 *that it is altered continuously is to dispute too much what is obvious; for*
 alteration is into the opposite. And a stone becomes neither harder nor
 softer; ...

Introductory Note

The reconstruction here of Aristotle’s reasoning in the passage involves some difficulties discussed subsequently. My interpretation here essentially follows Ross (p. 692), Aquinas (8.1010), Simplicius (1199.20–1200.3), Philoponus (826.23–

32 = 883.32–884.9) and Themistius (216.12–14), and cf. Graham's second suggestion (pp. 68–69). There are three arguments on this view.

Analysis

Argument *I* (253b23–26), concerning the beginning of alteration, appeals to sudden change, as in the second argument against continuous shrinkage (253b14–23, immediately preceding). Aristotle argues, admittedly (*I.a*) the parts of what alters, which must be continuous, are infinitely divisible (b23–24); nevertheless (*I.b*) the alterations need not proceed continuously and infinitely through the parts (b24–25), because (*I.b.i*) alteration is often preceded by rest (supplied), since (*I.b.i.i*) the whole body can alter together (b25), as (*I.b.i.i.i*) for example in the case of water freezing (once it becomes cold enough) (b25–26).

Argument *II* (253a26–30), concerning the end of alteration, is (*II.a*) that no indefinitely continuous process occurs (for example nobody ill recovers indefinitely) (b28–30), since (*II.a.i*) all change is into the opposite state (b30), because (*II.a.i.i*) for instance, change is from sick to healthy (b27–28); and (*II.a.i.ii*) this is not instantaneous (b27), because (*II.a.i.ii.i*) becoming healthy requires a period of time (b26–27) – and (*II.a.i.iii*) if the change is continuously toward an endpoint, it must stop at some time (supplied).

Argument *III* (253b30–31) is barely indicated. It must be that (*III.a*) not everything undergoes alteration forever (supplied), since (*III.a.i*) we see some qualities manifestly not changing (supplied), as (*III.a.i.i*), for instance, a rock remains unchangingly hard or soft (b30–31).

Commentary

Perhaps in Argument *II* (253b26–30), as the supplied *II.a.i.iii* indicates, Aristotle rejects the idea that someone might be continuously altering in an illness, and would become healthy at the endpoint alone, although that might never happen, and so the alterations continue indefinitely; then Aristotle argues that actually the invalid is at any moment altering overall towards illness or towards health, and thus each alteration is limited. Here the example that health, as the opposite of sickness, is the goal of recovery (253b27–28) is construed following Cornford (1934, p. 297 n. c); Graham (1999, pp. 68–69) suggests Aristotle might alternatively mean that thus the emergence of full health is instantaneous, as with freezing, but the assertion that alteration is into the opposite (253a30) supports Cornford. Graham (loc. cit.) apparently follows Owen (p. 249 with n. 30), *contra* Ross, and cf. similarly Kouremenos (p. 13) and Bolotin (pp. 334–335), in first suggesting this argument is meant to parallel the case of freezing in the first, but that is exactly the opposite of what Aristotle says about getting well at 253b26–27, that it does not change at the endpoint. The explanation of

‘sudden’ processes like freezing is presumably that the ‘force’ of the agent accumulates over time to reach the minimum quantity necessary to have an effect (see above, *Analysis and Commentary* on 253b14–23, esp. p. 66).

In Argument *III* I follow Simplicius (1200.4–9), Philoponus (826.31–32 = 884.6–9) and Aquinas (8.1011), treating the example that a stone becomes neither harder nor softer (253b30–31) as a separate argument by counterexample against the claim alteration is continuous. Cornford (1934, p. 299 n. *a*), Graham (1999, pp. 69–70) and Themistius (216.15–17) link this example with what immediately follows (253b31–33, where the argument against continuous locomotion begins), since both points refer to a stone. But the otherwise systematic treatment of types of movement in turn during the rejection of universal movement, noted by Todd (trans. of Themistius, p. 141 n. 654), suggests the further use of the example of a stone for the next topic, locomotion, results from association of ideas.

Ch. 3, 253b31–254a3: (*B.2.4*) Rejection of some Continuous Locomotion, *Contra ii*

253b31 ... and with regard to transportation, it would be amazing if a stone's
being transported down or resting on the earth had escaped notice. And
b35 moreover earth and each of the others of necessity rest in their proper
254a1 places, but are moved by force out of them. So given that some of these are
in their proper places, necessarily not all of them are being moved in place.

So on the basis of these and other similar considerations one could have confidence that it is not possible either for everything to be in movement or everything to be at rest.

Introductory Note

Aristotle regularly refers to locomotion as *phora* (‘transportation’, ‘being carried’), in accordance with his conception of the moving cause as always in contact with what it moves (see *Ph.* 3.2, 202a6–12), but this is problematic for him regarding elemental movement, for which see Ch. 4.

Analysis

The conclusion that everything is not always in locomotion (254a1) is supported by Argument *I*, implicitly denying the claim of the proponents of universal movement that we don’t notice the continuity of sufficiently slow or so small movements, since (*I.a*) we can perceive whether something is in locomotion or at rest in place (supplied: see 253b32), because (*I.a.i*) it is implausible that

we could not observe a stone either falling or resting on the earth (253b31–33) – then Argument *II* involves support for this perception from his elemental theory, that (*II.a*) each of the elements rests in its proper place and is only moved from there by force (253b33–35).

Commentary

As Zekl (p. 284 n. 37) notes, although the latter argument appeals to elemental behaviour on Aristotle's own theory, his appeal to perception in the first rejects Heraclitean flux theory. Cornford (1934, p. 298 n. *a*) and Themistius treat both 253b30–31 (in the previous section) and here b31–33, Argument *I*, as denying imperceptibly slow movements, and Graham generally as defending perceptions of stability (thus excluding any present movement from the stone), but for 253b30–31 see the *Commentary* on Aristotle's treatment of alteration above (pp. 67–68).

Ch. 3, 254a3–15: (B.3) Things Alternately in Movement & at Rest, *Contra iii.α'*

But in truth nor is it possible for some things to be always at rest and others always in movement, yet nothing sometimes at rest and sometimes in movement. In these cases, just as in those mentioned before, it must be stated that it is impossible (for we see the changes mentioned⁴ happening in the same cases); and in addition to this, because anyone disputing it is resisting what is obvious. For there will be no growth; nor will there be forced movement, unless something is moved against nature that was previously at rest. Then this account annihilates generation and destruction; and in fact being moved seems to practically everyone to be a kind of generation and destruction; for something comes to be that, or in that place, to which it changes, and that from which it changes is destroyed, or its presence there is destroyed. As a result it is clear that some things are in movement (sometimes), and others at rest sometimes.

Introductory Note

Aristotle here (254a1–5) initially reminds us of his general strategy employing the analysis of all possible dispositions of movement and rest in the cosmos, for which see above, *Ch. 3, 253a24–30: (A.2) the reformulated question* (pp. 55–

4 I.e., changes between rest and movement (thus Ross, p. 693).

57). He has now excluded the possibilities (i) that everything is at rest and (ii) that everything is in movement, and next here rejects the possibility (iii.α') that there are only those things either in everlasting movement or everlasting rest. This already follows from the details of his arguments against (ii) universal movement above, which implied that some things alternate between movement and rest, e.g. living things resting in between growth and shrinkage (253b14) and rock that is worn away or dislodged (b14–23), liquids that freeze (b23–26), someone who recovers from illness (b27–30), and a stone that falls to earth (b31–35), but Aristotle here makes this explicit.

There is a small problem how Aristotle thinks that some beings are intermittently in movement and otherwise at rest, since he claims there are always movements in a resting animal (*Ph.* 8.2, 253a15–21, 8.6, 259b8–11), and that the elements “and other things like them” are always active (*Metaph.* 9.8, 1050b28–30). The solution is that animals alternate *particular* changes, e.g., locomotion, with rest, while the activity of the elements, as movement, is only ideally continuous (imitating the heavens), and includes temporary active occupation of their proper places; cf. 8.4, 255b8–12 with Kouremenos (pp. 40–41 and ns. 50–51).

Analysis

Here Aristotle argues that some beings are not always in movement or always at rest (254a3–5, a33–35, cf. a14–15), with two main arguments, (I) by appeal to perception (254a5–10), and (II) from rest as a prerequisite for some change (254a10–15). In Argument I from perception, Aristotle first notes (I.I) what the previous arguments against universal movement imply, (I.I.a) that just as there it proved necessary that some things alternate between movement and rest, similarly that is so here (254a4–5), since (I.I.a.i) we observe this alternation (254a6–7) – then he provides (I.II) an argument from key previous results, (I.II.a) that someone rejecting this alternation has to reject more of what is observable than he would want (254a8), for two particular reasons, (I.II.a.I.i) that there would be no growth unless it alternated with shrinkage (254a9; cf. 253b13–14); but (I.II.a.I.ii) evidently there is growth (supplied) – and secondly (I.II.a.II.i) that there would be no unnatural movement unless its subject was previously at rest (254a9–10), because (I.II.a.II.i.i) unnatural movement (specifically, locomotion) is away from something's proper place and natural movement towards that (supplied); and (I.II.a.II.i.ii) the elements all rest in their proper places (supplied) – while (I.II.a.II.ii) there evidently is unnatural movement (supplied).

In the main Argument II, from rest as a prerequisite for some change (254a10–15), Aristotle argues (II.a) that unless movement alternated with rest

there would be no movement (supplied), since (*II.a.i*) there would be no generation or destruction (254a10–11), because (*II.a.i.i*) generation and destruction presuppose being and non-being, as rest states (supplied, see below); yet (*II.a.i.ii*) they are movements, in the sense of changes (supplied) – while (*II.a.ii*) all other movements are also qualified generations and destructions (254a11–12, cf. *Ph.* 1.7, 190a31–b1, 5.1, 225a12–17), because (*II.a.ii.i*) in growth and shrinkage, alteration and locomotion, one attribute, or being in one place, is generated and another is destroyed or ceases (254a13–14).

Commentary

Bolotin (p. 336) argues that the appeal to perception in Argument *I* is indicative of Aristotle's approach to physics generally, involving a commitment to the perceptible world as such, in particular to re-orient our beliefs so we accept the appearances of perceptible things as what they truly are (by contrast with atomism and other forms of theoretical reductionism, presumably). In 254a9, here *I.II.a.I.i*, it looks at first as if the counterfactual denial of growth is subject to the following condition, “unless something is moved against nature that was previously at rest” (254a9–10): so, e.g. Todd (trans. of Themistius, p. 141 n. 658). Accordingly Alexander (ap. Simplicius 1201.13–19; cf. Philoponus 884.15–17) explained it as referring to unnatural upward movements of food during digestion. Ross (p. 693) by contrast, and Simplicius (1201.19–23), apparently following another suggestion by Alexander (fr. 574 Rashed; cf. Philoponus 827.22–23), take the denial of growth separately, as a reference back to the argument of 253b13–14; yet then Ross, and cf. Graham (1999, p. 70), interprets it as that growth requires rest since it must start from rest, which confuses the present Sub-argument *I.II.a.I* with the following (254a9–10, here *I.II.a.II*). I follow rather Cornford (1934, p. 299 n. c), that growth must stop at maturity. Perhaps *I.II.a.II.i.ii* (supplied), that the elements rest in their proper places, is obvious, but Simplicius (1201.9–11) considers it worth explicating. One might consequently think Sub-argument *I.II.a.II*, at 254a9–10, is a *petitio principii*, but see Lang (1998) on both the fundamental importance of this position for Aristotle and his methodology.

In Argument *II* I follow Philoponus (828.1–6) and Simplicius (1202.9–11, 23–25) in supplying conclusion *II.a*.

Notes

Philoponus (827.13–19, 884.10–13) explains “changes mentioned” in 254a6–7, here *I.I.a.i*, as meaning the alternating opposed movements (implying that there must be rest between them), not directly the alternation of movement and rest; I follow rather Ross (p. 693) and Simplicius (1200.36–1201.1).

At 254a10–11, where I supply *II.a.i.ii*, the claim that generations are themselves movements (changes), Philoponus (827.24–30 = 884.18–23) observes that otherwise Aristotle means they depend on underlying material changes.

Graham (1999, p. 71) treats the claim at 254a11–12, here *II.a.ii*, that all other movements are also qualified generations and destructions, as justifying the preceding 254a10–11, here *II.a.i*, that generation and destruction would be annihilated, but the use of δέ, not γάρ (254a11) suggests he is mistaken. I follow rather Ross (p. 693) for the justification of a10–11. Accordingly I supply *II.a.i.i*, that generation and destruction presuppose being and non-being as rest-states, roughly with Simplicius (1202.4–8); Themistius (216.27–29) states the same point counterfactually (imagining things individually in unending generation or destruction).

Ch. 3, 254a15–23 and a33–b6: (B.4) Conclusion of Chapter

254a15 *We should now relate to our earlier discussions the claim that all things are sometimes at rest and sometimes in movement; and we should make a start from what has now been distinguished, the same start we began from before. For in fact either everything is at rest, or everything is in movement, or some beings are at rest and others in movement; and if*
a20 *some are at rest and others in movement it is necessary that either everything is sometimes at rest and sometimes in movement, <or some things are always at rest and others always in movement,>⁵ or some things always at rest, others always in movement, and others sometimes at rest and sometimes in movement.*

(I omit here 254a23–33, which argues on two grounds that it is impossible that everything is at rest, presented and discussed above as *B.2.II* and *B.2.3*, pp. 60–63, following 253a32–b6, here *B.2.I*.)

254a33 *But similarly it is impossible also that everything is in movement, or that*
a35 *some things are always in movement and the others always at rest. For*
254b1 *with regard to all these there is one sufficient assurance; for we see that some things are sometimes in movement and sometimes at rest.*

5 Supplement by Ross following Prantl (cf. 253a26–27).

As a result it is clear that it is similarly impossible that everything is at rest, that everything is continually in movement, and that some things are always in movement and the others always at rest. So it is left to observe whether all things are of the kind that are moved and at rest, or whether some are so, while others are always at rest and others again always in movement. And the latter is what we must demonstrate. b5

Analysis and Commentary

Aristotle now provides a programmatic note. In 254a15–23, he first raises in turn the next possibility, previously numbered *iii.β'*, that everything is of the kind now established to exist, things that alternate between rest and movement, from his earlier analysis of possible dispositions of the cosmos (for which see above, *Ch. 3, 253a24–30: (A.2) the reformulated question*, pp. 55–57); then he repeats the list of possibilities from 253a24–30.

On the intermediate passage 254a23–33, not presented here, see above the *Note on (B.1) the rejection of (i) universal immobility (253a32–b6 & 254a23–33)* (pp. 57–58), with *Ch. 3, 254a23–30: (B.1.II) dialectical argument against (i) universal immobility* (pp. 60–62) and *Ch. 3, 254a30–33: (B.1.2) argument from the status of principles, contra i* (pp. 62–63).

Finally in 254a33–b6 Aristotle summarises what he has established so far, and specifies what he intends to establish subsequently. Following the additional arguments omitted here against possibility *i*, universal rest, he reminds us he has also excluded possibility *ii*, universal movement (254a33–34, cf. b2–3: see above 253b6–254a3, here *B.2*, pp. 63–69), and possibility *iii.α'*, that there are only things always in movement and always at rest (254a34–35, cf. b3–4: see above 254a3–15, here *B.3*, pp. 69–72). After repeating this summary of exclusions (254b1–4) Aristotle specifies that the remaining two possibilities from his analysis are either (*iii.β'*), that everything is alternatively in movement and rest (mentioned above 254a15–16), or (*iii.γ'*), that, in addition to the former, now shown to exist, there are also beings everlastingly in movement and everlastingly motionless (254b4–6); then he announces he will demonstrate that the latter (*iii.γ'*) is the case (b6).

Notes

The initial reference to “our earlier discussions” (254a15) is vague; Ross (p. 693) refers it to the proof that movement is, as a whole, everlasting in *Ch. 1*, but Cornford (1934, p. 301 n. *b*) to the initial division of theories in *Ch. 3, 253a24–30*. The latter is certainly meant in the following sentence by “the same start we began from before” (a17–18), as Aristotle’s repeated analysis of possible states makes clear (254a18–22). In fact his demonstration of *iii.γ'* in *Ch. 6* will explain why,

as argued in Chs. 1–2, movement as a whole is everlasting, even among individually intermittently moving beings, and will answer the problems remaining from Ch. 2 and alluded to again initially in Ch. 3, what causes the latter kinds of beings to begin movement, how there can be an individually everlastingly continuous movement (in Chs. 7–9), and how animals move themselves (see above, *Commentary* on Ch. 2 and esp. *Ch. 3*, 253a22–24, a30–32: (A.1) *definition of the subsequent inquiry*, pp. 52–55); thus “our earlier discussions” (254a15) is perhaps best taken as a general reference to all of Chs. 1–2 and the start of Ch. 3.

Seeck (p. 137 with n. 1; cf. p. 169) asserts that 254a16–18 announces a new start (ἀρχήν, a16), and that it is surprising that what follows is then summary, but actually Aristotle does not call his *archē* here new, but rather explicitly says he is returning to an earlier starting point, manifestly the division among possible states of the cosmos. Seeck (loc. cit.) also claims that lines 254a33–b1 are a doublet of 253b6–254a15, but this is only trivially true inasmuch as the latter passage summarises the conclusions of the former; cf. the introductory *Note on* (B.1) *the rejection of(i) universal immobility* (253a32–b6 & 254a23–33) (pp. 57–58) for an earlier claim by Seeck to identify a doublet.

The Universality of a Cause of Movement

Introduction to Chapter 4

Ch. 4 contains one continuous argument (Part *A*, 254b7–255b31) defending the claim everything in movement is moved by something (stated 256a2–3), followed by a brief summary of the conclusions (Part *B*, 255b31–256a3). The overall conclusion accords with Aristotle's programmatic remark at the end of Ch. 3, 254b4–6 suggesting the next topic is the question whether in addition to intermittently moving beings there are also everlastingly moving and everlastingly resting ones; that is established by the end of Ch. 6, and the principle Ch. 4 supports, that everything moved is moved by something, is generally presupposed (although not explicitly invoked) in Ch. 5, defending the claims that the first mover is most properly the cause of movement and that this is unmoved, and stated in Ch. 6 (259a30–31), during the argument that there must be an absolutely unmoved first mover, something everlastingly at rest, and likewise a body it everlastingly moves.

Moreover the topic of Ch. 4 also accords with the earlier programmatic remarks concluding Ch. 2 and beginning Ch. 3 (253a20–24 and a30–32) which assert the starting point of the inquiry as a whole (i.e., the question which kinds of beings with respect to movement there are) provides the means to solve the problems why some beings are only intermittently in movement, and why animal locomotion is not entirely autonomous. The demonstration in Ch. 4 that each movement has a moving cause confirms that each lifeless body is only moved because of an external mover (Ch. 2, 253a2–3), and so returns to the question why such causes only act intermittently on individual bodies (253a3–7), a question implicitly extended to external influences on animals (253a20–21). The answer involves the everlastingly rotating heavenly spheres influencing terrestrial nature (see Ch. 6, 259b15–16, 260a1–19).

Aristotle begins Ch. 4 with several preliminary distinctions in 254b7–14 (here Section *A.1*): things may cause movement or be moved either intrinsically or incidentally (254b7–8); intrinsically moved things may be moved by themselves or by something else (254b12–13); and they may be moved naturally or unnaturally, i.e., by force (254b13–14). For the first distinction see below on the initial passage of Ch. 4; scholars find the relation between the latter two in the following argument confused. From his terminal summary (255b31–256a3, Part *B*) it is clear Aristotle's overall strategy is to argue everything is

moved either by itself or something else (thus the interpretation of 254b12–13 here), because everything is moved either naturally or by force (254b13–14: see 255b31–32), while everything moved by force is moved by something else (254b24–27) and everything moved naturally is moved either by itself or something else (255b33–256a2). Accordingly he first justifies the exhaustiveness of the distinction between natural and forced movement (254b14–24, here Section A.1). He does this by showing that self-movers are moved naturally (b14–20), while everything moved by something else is moved either naturally or unnaturally; yet, if this procedure presupposes that we already know everything is either moved by itself or something else, the subsequent reasoning to the latter result would seem to be circular. In fact the argument must be inductive and not involve this presupposition: see further the *Commentary* below.

Next Aristotle argues briefly and uncontroversially in Section A.2 that everything moved *unnaturally* is moved by something else (254b24–27); the justification of the claim that everything moved *naturally* is either moved by itself or something else (A.3) divides into the cases (A.3.1) of animals as self-movers (254b27–33, here presented together with 254b24–27), and then inanimate bodies in A.3.2 (254b33–255b31). The latter occupies Aristotle longest, given his doctrine that an element's movement is in each case naturally to its own proper cosmic place (fire and air upwards, water and earth downwards), and the appearance that this is spontaneous; see below the preliminary *Note on Ch. 4, 254b33–255b31: (A.3.2) things naturally moved by something else* (p. 85). There are three main subsections: in A.3.2.1 Aristotle first introduces the problem (254b33–255a5), motivating it in A.3.2.1.1 by arguing such light and heavy things do not move themselves (255a5–18). In A.3.2.2 he argues that what generates them intrinsically causes their movement, here divided into three subsections A.3.2.2.1–3: see below the *Note on Ch. 4, 255a18–b24: (A.3.2.2) the intrinsic cause of elemental movement* (pp. 90–91). Finally in A.3.2.3 Aristotle argues that anything removing what obstructs an elemental body's immediate movement towards its proper place incidentally causes the movement (255b24–31). Part B provides a summary conclusion (255b31–256a3).

Verbeke (p. 153) notes it would be trivial to infer that everything in movement is moved by something, not requiring the argument of Ch. 4, if κινούμενον (and κινεῖσθαι) were necessarily grammatically passive, rather than middle (although that is subsequently argued by Lang, 1998, pp. 40–50, and cf. 233–245). Moreover Verbeke argues (p. 156) that Aristotle could have easily inferred that a moving cause is required from his definition of movement as a potentiality, requiring an agent to actualise it (cf. *Ph.* 3.1–3); thus he concludes Aristotle's aim here is to argue as a physicist, not applying metaphysical notions, but

appealing to concrete experience. Aquinas (8.1021) thinks this chapter is merely a verification of the result of *Ph.* 7.1, where the same proposition was proven “with a common argument taken from movement itself”, here confirmed by reference to all movers and mobile objects.

Graham (1996) and (1999, pp. 74, 75–77) follows the long line of scholars thinking Ch. 4 contradicts Aristotle’s doctrine in *Ph.* 2.1 that nature is an internal source of movement; cf. similarly, e.g., Gill (1989, p. 238 n. 60). Solmsen (1960, pp. 232–234, cf. 100–101) claims this results from a tension between Aristotle’s adaptation of two related Platonic principles, (i) from the latter’s definition of the soul, the conception of that which moves *itself* applied, after revision, in his own definition of nature, and (ii) the principle that everything in movement is moved by something (which, for Aristotle, ultimately means by something *else*). It is easy to reconcile the definition of nature with Aristotle’s treatment of animals as self-movers here, and controversy focuses on the case of the elements. But Waterlow (1982, pp. 229–232, cf. 258–261) rejects Solmsen’s assumptions (i) that Aristotle ever identifies natural change with self-change, (ii) that he regards the analysis of a self-changer into agent and patient parts (in Ch. 5) as disposing of the reality of self-change, as well as the view (iii) that the identification of environmental causes of animal, and generally all terrestrial, movement in Chs. 2, 5 and 6 is inconsistent with the doctrine of nature in Bk 2, arguing that not all such causes are of the same kind.

Graham states that in *Ph.* 2.1 natural things are said to “originate their own motion or change without the need for external intervention” (1996, p. 174), assuming that the external moving cause is there excluded (cf. 1996, p. 184). But that is false. The external moving cause in nature is recognised at *Ph.* 2.1, 193b8–12, and also in 2.3 (= *Metaph.* 5.2) and 2.7, 3.3, and cf. *Metaph.* 1 and 12.2–5. Wieland (pp. 252–253 with n. 18) also reconciles the two texts, by arguing that *Ph.* 2.1 merely establishes that a natural thing has a movement not reducible to external force, but whose characteristics are determined by that thing’s own nature. For another detailed defence of the consistency of the texts see Lang (above), arguing that in *Ph.* 2.1 Aristotle defines nature in terms of the potential to be moved, not to move itself; cf. Themistius (220.3–6), expanding *Ph.* 8.4, 255b30–31, and Sorabji (1988, pp. 219–222).

Ch. 4, 254b7–14: (A) Preliminary Distinctions & Overall Argument

Among things that incite movement and things moved, some incite movement and are moved incidentally, and others do so intrinsically (καθ’ αὐτά), incidentally, for instance, all those that do so by belonging to

4, 254b7

b10 *things that incite movement or are moved, and those that do so in respect of a part; and intrinsically all those that do so neither by belonging to what incites movement or is moved nor by a part of themselves inciting movement or being moved. Among things that do so intrinsically some are moved by themselves and others by something else, and some naturally and others by force and unnaturally.*

Analysis

The overall conclusion of the chapter is that everything moved is moved by something (see below, 256a2–3). This passage provides the top-level premisses of the argument supporting this, (a) that all movers and things moved are so either incidentally or intrinsically (254b7–8), since (a.i), for instance, movers and things moved in respect of the action of a part, or of wholes of which they are themselves parts, incite movement or are moved incidentally (254b8–10); while (a.ii) movers and things moved neither in respect of the action of a part, nor of wholes of which they are themselves parts, incite movement or are moved intrinsically (254b10–12) – and (b) incidental movers and things moved are entirely the result of intrinsic movers and things moved (supplied); but (c) all things moved intrinsically are either moved by themselves or by something else (254b12–13), since (c.i) all things moved intrinsically are either moved naturally or unnaturally (i.e., by force) (254b13–14, cf. 255b31–32); but (c.ii) all things moved unnaturally are moved by something else (see below 254b24–27, 255b32–33); and (c.iii) all things moved naturally are moved by themselves or by something else (see below 255b33–256a2).

Commentary

Aristotle only states the conclusion to the chapter's single argument, that everything moved is moved by something, at the very end (256a2–3), but it follows from this passage if the divisions he makes here are taken as exhaustive, something the wording of each division, τὰ μὲν ... τὰ δέ ... ("some ... others ...", 254b7–8, b12–13, b13–14; cf. b9–10), suggests without requiring. Yet the divisions into intrinsic and incidental movers and things moved, and into naturally and unnaturally moved things, are necessarily comprehensive, which suggests Aristotle means the same in the case of the division into self-moved and other-moved things. Thus he apparently implies the conclusion by the key Premiss c, at 254b12–13, that there is either an internal or an external mover for everything moved. Yet the truth of this still has to be established (hence the support of c.i–c.iii: see below).

Initially Aristotle here distinguishes between intrinsic and incidental movers and things moved (254b7–8, here a). At *Ph.* 4.4, 211a17–23 he similarly

divides incidental movement into movement of a physical part (*qua* intrinsically movable itself), and movement attributed to a non-physical feature of the whole, in virtue of movement of the whole. Yet Simplicius (1207.4–17; cf. Aquinas 8.1022) notes movement in respect of a part is distinguished from incidental movement at *Ph.* 5.1, 224a21–b1. Themistius (217.7–12) in his paraphrase substitutes the threefold distinction from *Ph.* 5.1, although that contradicts Aristotle's explanation of his current use of the terms (254b8–12, here *a.i* and *a.ii*). But it is unlikely this passage is meant as an official definition, since subsequently 255b24–29 implies that whatever removes an obstruction is an incidental cause of an element's movement. "For instance" (οἷον, 254b9) introduces *a.i*–*a.ii*, but what follows are not just individual examples of intrinsic and incidental movement, since together they are comprehensive and mutually exclusive. Thus this is presumably a hypothetical definition, merely sketching the distinction.

Aristotle apparently focuses hereafter on intrinsic movement (τῶν δὲ καθ' αὐτὰ, 254b12), and accordingly we must supply Premiss *b* that incidental movers and things moved are entirely the result of intrinsic movers and things moved. The later identification of what removes an obstruction to natural movement as an incidental cause is not inconsistent, since the remover of an obstruction only functions as a cause given the action of the intrinsic cause (for elements, the cause of generation). Alexander (*Against Galen* 67a9–10) thinks Aristotle restricts the argument to intrinsic movement because incidental movement is not real, Themistius (217.10–11) because non-intrinsic movers and things moved are indefinite in range and kind, and Graham (1999, pp. 83–86, 88–89) similarly, since incidental movers do not explain the movement of the elements; yet Graham seems to be introducing modern conceptions of causal explanation and movement inconsistent with Aristotle's (cf. Graham, 1999, p. 88, "To make the element is to confer motion upon it, but it is not to *impart* motion", his italics). I suggest Aristotle assumes that what is shown to be the case for intrinsically moved things will effectively also cover the case of incidentally moved things, because in those cases, to identify the subject and cause of movement properly (e.g., the whole of which the former is a part, or the part of which it is a whole) would be to re-identify them in terms of instances of intrinsically moved things and their intrinsic causes. Thus apart from showing how they are related to intrinsic causes there can be no separate explanation of the causality of incidental causes. Note that it is unclear whether animals really should be treated as intrinsically self-moving in what follows, but they presumably meanwhile are so, since they move themselves naturally (φύσει, 254b17–18). Yet this treatment is merely provisional (254b29–33; cf. Ch. 5), as is the definition of intrinsic movement (see above).

Finally here Aristotle establishes the basis for defending his main claim in the chapter, by distinguishing things moved by themselves and by something else (254b12–13, here *c*), and things moved naturally and by force (254b13–14, here *c.i*). In stating the division into naturally and unnaturally moved things, Aristotle does not indicate what I suppose here, that it is used to show that the division between things moved by themselves and by something else is exhaustive; the distinctions are linked by καί (254b13). Yet here Aristotle is merely assembling resources for the argument to come, not yet analysing their relations. These only become clear in the light of the argumentation following (see esp. 255b31–256a3); this involves a problem of apparent circularity in 254b14–24, on which see the *Commentary* (pp. 81–82), and the *Introduction* (pp. 75–77) above, discussing the chapter’s overall argumentative structure.

Ch. 4, 254b14–24: (A.1) Exhaustive Division into Natural & Unnatural Movement

254b15

For what is moved by itself is moved naturally, as each of the animals is (for each animal is moved by itself, and we say that all those things with a source of movement in themselves are moved naturally: for this reason the animal as a whole moves itself naturally, although the body can be moved both naturally and unnaturally; for it makes a difference what kind of movement it happens to be moved with, and what kind of element it happens to be constituted from). And of things moved by something else some are moved naturally and others unnaturally, as earthen things are moved upwards unnaturally and fire downwards, and furthermore the parts of animals are often moved unnaturally, contrary to their postures and manners of movement.

b20

Analysis

This passage supports the final claim of the preceding one, that all things moved intrinsically are either moved naturally or unnaturally, i.e., by force (254b13–14, cf. 255b31–32). Aristotle argues inductively that whatever is not moved naturally is moved unnaturally, taking two examples, (I) animals *qua* self-movers (254b14–20); and (II) things externally moved (b20–24). The first argument contains two main premisses, (I.a) that an animal as a whole moves itself by nature (254b14–15, b17–18), because (I.a.i) an animal moves itself (b15–16); but (I.a.ii) what moves itself has an internal principle of movement (supplied); and (I.a.iii) what has an internal principle of movement is moved naturally (b16–17; cf. *Ph.* 2.1, 192b11–15) – but (I.b) when an animal’s body is not

moved naturally, it is moved unnaturally (b18–19), since (*I.b.i*) whether it is moved naturally or unnaturally depends on which movement it is moved with, and what element it is made from (b19–20); while (*I.b.ii*) when the body is moved, but not with its natural movement, it is moved unnaturally (supplied); and (*I.b.iii*) in some cases where the element the body is made from is moved naturally, the body as a whole is moved unnaturally (supplied).

Argument *II* is that things moved externally also show that things are moved either naturally or unnaturally (254b20–22), by two separate sub-arguments, first (*II.I*) because (*II.I.a*) the terrestrial elements are naturally moved up or down (supplied); but (*II.I.b*) when they are moved not in their natural direction elemental masses are moved unnaturally (supplied), since (*II.I.b.i*), for instance, masses of earth moved up, or fire down are moved unnaturally (254b22) – secondly (*II.II*) because (*II.II.a*) animals' parts have a natural movement (supplied); but (*II.II.b*) when these parts are moved contrary to their natural postures and manners of movement they are moved unnaturally (b23–24).

Commentary

Ross (p. 694) states that this passage effectively compares the division into things moved by themselves and by something else with that into things moved naturally and unnaturally, to establish that all self-moved things are moved naturally, but some things moved by something else are moved naturally, others unnaturally (i.e., by force); but that obscures Aristotle's point and method. Sorabji (1988, p. 221) mistakenly assumes the two distinctions are meant to coincide: see, e.g., 254b20–22, here the conclusion to Argument *II*. Graham (1999, pp. 74–75), who thinks it is unclear how the two distinctions are related, discusses whether they are independent primarily with reference to whether all possible combinations are realised; certainly (*I.a*), that an animal as a whole moves itself by nature (254b14–15, b17–18) excludes the possibility of unnatural self-movement. Waterlow (1982, p. 166) claims that Aristotle divides all changes first into natural and unnatural, then the former into organic and inorganic (similarly Wagner, p. 674), but this simplification does not match the text; see rather Alexander (*Against Galen* 67a10–25).

The chapter's overall argumentative structure, for which see the *Introduction* (pp. 75–77), requires an inference, from the claim (i) that all things moved intrinsically are so either naturally or by force, to the claim (ii) that they are therefore either moved by themselves or by something else (see accordingly 254b12–13 and b13–14, discussed above, and cf. 255b31–256a3 where this is explicitly presented as the argument). Yet the present passage apparently gives the reverse logical relationship, whereby Aristotle argues that the dis-

inction into things moved naturally and by force is exhaustive because everything moved by itself or by something else is moved either naturally or by force. Scholars have accordingly inferred a presupposition here that the division between things moved by themselves and by something else is exhaustive; thus some think that Aristotle is guilty of a *petitio principii* (cf. the chapter *Introduction*, and e.g. Graham, 1999, pp. 77–78), but that is not so. Aristotle appeals to self-movers and externally moved things heuristically, as cases in an *epagōgē*, from which the principle emerges that any movement that is not natural is unnatural in the stronger sense of forced, as contrary to a natural movement. So Themistius (217.12–20), not entirely incorrectly (although unhelpfully), ignores both the early introduction of the distinction between what is moved by itself and by something else, and the present argument, treating it merely as elaborating the distinction between what is moved naturally and unnaturally.

Notes

Aristotle's use of *ὅλον* (254b15, here *I.a*), introducing animals as self-movers, might suggest an induction from an example to the general case of self-movers, as at b22 below (from elemental masses to all externally moved things), but according to Aristotle, no other beings except animals are self-moving (Ch. 6, 259b8–11: locomotion is the only self-movement, excluding plants; 259b28–31: even incidental self-movement is restricted to perishable things, excluding the heavenly bodies). Subsequently at 254b29–33 (see below) Aristotle assumes that self-movers contain a part inciting movement (*τὸ κινεῖν*) and a part naturally subject to movement (*τὸ κινούμενον*); he argues at 255a6–11 that a self-mover's movement is "up to it" (voluntary), since the agent can reverse and stop itself. Ch. 5, 257a31–258b4 demonstrates the division of self-movers into mover and moved parts, in which the mover is incidentally moved along with the moved part it directly moves.

At 254b19–20, here *I.b.i* ("for it makes a difference ... what kind of element the animal happens to be constituted from"), Aristotle may refer to unintentional movements like falling: see *I.b.iii*, supplied above. Alternatively, this is an independent argument for the claim that animals' bodies are also moved unnaturally, that the animal's self-movement (e.g., flying, or leaping) is unnatural for the element (i.e., earth) of which the body is predominantly composed: thus Themistius (217.16–18), Simplicius (1207.30–1208.8), Philoponus (829.12–18) and Aquinas (8.1023). Ross (p. 694), apparently followed by Waterlow (1982, pp. 214–215), similarly thinks Aristotle refers to both natural and unnatural movements of the body *qua* material compound, as opposed to those of the body as integral part of a self-moving whole, as he is taken here.

On 254b23–24, here *II.II.b*, Simplicius (1208.22–26) claims that Aristotle assigns the unnatural movements of animals' parts to movement by something else (rather than movement by the animal itself) since the external mover is directly obvious in such cases; see rather the following note for what Aristotle's reference to movements contrary to the animal's natural postures, and manners of movement, implies: what is directly obvious is the unnaturalness of the movement, not the mover (cf. 254b29–30). Aquinas (8.1024) says it is true by definition that unnatural movement, *qua* movement by force, results from an external mover, citing *EN* 3.1, 1110a1–3, which is consistent with the explanation here. The key point is that such movements are unnatural *for the part concerned*, and so we treat them as movements of the part as such, not the whole, and accordingly they require something else to move them (which Aristotle argues below).

At 254b24, in *II.II.b* here (“furthermore the parts of animals are often moved unnaturally, contrary to their postures and manners of movement”), Ross (p. 694) and Cornford (1934, p. 306 n. *a*), following Simplicius (1208.18–20) and Alexander (fr. 582 Rashed), exemplify unnatural posture with a man walking on his hands, and unnatural manner of movement with rolling on the ground instead of walking. Philoponus (829.19–25, cf. 884.29–34) prefers other examples as more accurate.

Ch. 4, 254b24–33: (A.2) Things Moved Unnaturally, and (A.3.1) Self-movers

It is particularly obvious in the case of things moved unnaturally that what is moved is moved by something because of its being clearly something moved by something else. And next after things moved unnaturally, it is obvious that among things moved naturally those moved by themselves, as are animals, are moved by something; for it is not unclear whether it is moved by something, but rather how one should distinguish within it what incites the movement and what is moved. For just as in boats and things not constituted by nature, so also in animals it seems that there is distinctly that which incites movement and that which is moved, and that this is how the whole moves itself.

Introductory Note

Having argued that everything is either moved naturally or unnaturally, Aristotle now begins the main part of his argument that everything is moved by

something, with the two easy cases, (A.2) what is moved unnaturally (254b24–27, cf. 255b33–256a2); and, among things moved naturally, (A.3.1) what moves itself (254b27–33). Thereafter he turns to the difficult case, things moved naturally by something else, e.g. the elements (254b33–255b31), for which see the subsequent passages in Section A.3.2 of the chapter (pp. 85–102).

Analysis

Here Aristotle first argues (A.2) that things moved unnaturally are moved by something (b24–25), since (a) they are moved by something else (b26–27).

Then he claims (A.3.1) that self-movers are moved by something (supplied: see 254b27–28), because (a) animals are clearly moved by themselves (254b28–29); (b) nevertheless it is not clear how the part within animals that incites movement differs from the part that is moved (254b29–30); yet (c) these do seem distinct (254b31–32), both *b* and *c* together because (b/c.i) the entire animal apparently moves itself similarly to the way boats and other artificial vehicles do (with a distinct helmsman, or driver) (254b30–33); but (b/c.ii) it is unclear what corresponds to the latter in an animal (supplied).

Commentary

Aristotle has already discussed animals in Ch. 4 at 254b15–20, to show that all things moved intrinsically are either moved naturally or unnaturally, arguing animals move themselves naturally because of an internal principle of movement (254b16–18); their self-movement is there evidence of their internal principle of movement (b15–16). Now in A.3.1 he states more specifically that their self-movement is evidence of a distinct internal mover (254b31–32), and thus as naturally moved they are moved by something (254b28–29 cf. 255b33–34). Furley (1994/1978, p. 5 with n. 3), and Waterlow (1982, pp. 212–213) correctly state that 254b30–33, here (b/c.i), supports b29–30, here *b* (i.e., that the precise distinction between mover and moved part remains unclear). Furley cites Simplicius 1208.30ff., and *de An.* 2.1, 413a8; but then (contra Furley) 254b30–33 must also support *c*, the claim that there is a distinction at all.

Aquinas (8.1024) and Wieland (pp. 252–253 with n. 18) claim Aristotle here reduces all movement to movement by another, since he reduces animal self-movement to the action of a moving part upon a moved part, but this conclusion is not suggested directly in Ch. 4, at least. More carefully, Wicksteed (p. 308 n. a), following the probable reading of Themistius (218.1–2), notes the implication that animals only move themselves as wholes incidentally, i.e., in virtue of a part, the body, that is intrinsically moved, and a part, the soul presumably, that is an intrinsic mover. Compare the definition of incidental movement

above (254b8–10), the statement above that an animal moves itself naturally as a whole (254b17–18) and above, *Commentary on Ch. 4, 254b7–14: (A) preliminary distinctions & overall argument* (pp. 78–80). Aristotle will give an extended justification for the distinction he makes between mover and moved parts in any self-mover below in Ch. 5, 257a31–258b4.

Plants also have an internal principle of movement according to Aristotle (*Ph.* 2.1, 192b8–15), but he does not call them self-movers, since he restricts self-movement to locomotion (Ch. 2, 253a14–15; Ch. 6, 259b6–7, b16–20); moreover, as he will argue below, while the elements also have an internal principle of movement, by which they tend to their natural places, they have only an external mover, not an internal one (254b33–255b31). The question then arises whether the final kind of beings whose locomotion is natural movement for Aristotle, the heavens, are more like the elements or animals in this regard. Here the argument treats animals as a case of self-movers, but is silent on whether they are the only case.

Note on Ch. 4, 254b33–255b31: (A.3.2) Things Naturally Moved by Something Else

After dividing everything moved into things moved naturally and unnaturally (254b14–24, Section A.1 above), and arguing (A.2) that things moved unnaturally are moved by something (254b24–27), and also (A.3.1) that among things moved naturally self-movers such as animals are moved by something (254b27–33), Aristotle now considers things moved naturally not by themselves, material bodies that either rise, like the elements fire and air, or fall, like earth and water (254b33–256a3). He claims these (and their compounds, in which one element predominates) are all moved by something else (and so by something).

The argument has three main parts: Section A.3.2.1 demonstrates there is a problem what, if anything, moves those things moved naturally not by themselves, identified as heavy and light things (254b33–255a5). This continues in A.3.2.1.1, showing these do not move themselves (254a5–18; cf. 255a29–31), with two sub-arguments, (I) from their unidirectionality of movement (a6–11), and (II) from their structural simplicity (a12–18). The second main section (A.3.2.2) then argues that the intrinsic cause of their movement is the moving cause of their generation (255a18–b24, cf. 255b35–256a1): for summary see the *Note on Ch. 4, 255a18–b24: (A.3.2.2) the intrinsic cause of elemental movement* (pp. 90–91) below. Finally Section A.3.2.3 argues that whatever removes any obstruction is an incidental cause of their movement (255b24–29, cf. 255b35–256a2).

which is again how he sums up the results at 255b31–35. That has implications for his overall argumentative strategy, as Graham (1999, pp. 77–79, 86–87) notes, although Graham is wrong to claim the distinction between things moved by themselves and by something else becomes irrelevant, as the *Commentary* here shows.

Here Aristotle thus effectively develops the question whether, in the relevant division, things naturally moved not by themselves *are* moved by anything else: see 254b35–255a1, here *b*, and 255a4–5, here *c.ii*. Light and heavy things exemplify the problem (255a2, here *c.i*), but see the *Commentary* on 255a5–18, here A.3.2.1.1 (following below) for other possible cases. Aristotle subsequently refers to the elements, earth, water, air and fire, but implicitly includes all sublunary bodies, as formed by homoeomerous elemental mixtures (cf. *GC* 1.10 and generally), since their natural movements up or down depend on their most prominent element (*Cael.* 4.4, 311a30–b2). The individual elements are naturally moved to their proper places in the cosmos (*Cael.* 1.8, 4.1–4), but the cause is obscure, since, as the following Section A.3.2.1.1 shows, they do not move themselves.

Ch. 4, 255a5–18: (A.3.2.1.1) Rejection of Elemental Self-movement

For it is impossible to say that they are moved by themselves, since this is characteristic of animals and distinctive of living beings, and they would be able to stop themselves. (I mean this in the sense that if something is responsible for its own walking, it is also responsible for its own not walking.) As a result, if for fire to be transported upward is up to it itself, it is clear that it is up to it also to be transported downward. But actually being moved with only one movement by themselves is unreasonable, if in fact they move themselves. Again, how can something continuous and of a single nature move itself? For insofar as it is one and continuous not by touch it is unaffected, but insofar as it is separated (internally) one part naturally acts and another is affected. Thus neither does any of these things move itself (since they are of a single nature), nor does anything else continuous. Rather in each case what incites movement must be distinct in relation to what is moved, as we see in the case of lifeless things, whenever something alive moves one.

Introductory Note

To reveal the difficulty about what causes natural movement in light and heavy things Aristotle shows here that they are not self-movers (like animals, 255a5–6,

a15). He provides two arguments, from (*I*) their movement's unidirectionality (255a6–11); and (*II*) their structural simplicity (255a12–18). See below for other accounts of the number and nature of the arguments.

Analysis

In Argument *I* he claims it would be unaccountable for the elements to be moved in only one direction if they moved themselves (255a10–11), because (*I.a*) the movement of things that move themselves is up to them (supplied), since (*I.a.i*) self-movement characterises living things (255a6–7) – while (*I.b*) if it was up to fire itself to be carried upwards, it would be up to it also to be carried downwards (255a9–10), since (*I.b.i*) if an element's movement was up to itself, it could stop itself (255a7), because (*I.b.i.i*) if something is responsible for its own walking it is also responsible for not walking (255a8–9) – and (*I.b.ii*) what stops itself can also move in the reverse direction (supplied); but (*I.c*) the elements are only removed from their proper places by force, i.e., unnaturally (supplied: see 254b22 and 255a2–4 above).

In Argument *II*, from structural simplicity (255a12–18), Aristotle reasons (*II.a*) elementary bodies are of a simple nature (255a15; cf. *GC* 1.9, 327a1); yet (*II.b*) no continuous and simple nature can move itself (255a12–13, a15–16), because (*II.b.i*) if something is one and continuous (not merely through contact), it is unaffected (by itself, 255a13); while (*II.b.ii*) what moves itself affects itself (supplied), since (*II.b.ii.i*), one part naturally acts, and another is affected, when something is internally differentiated (255a14–15); and (*II.b.ii.ii*) what moves itself must be divided into what incites movement and what is moved (255a16–17), because (*II.b.ii.ii.i*) it is similar to something alive moving something else (255a17–18).

Commentary

On whether this passage, and the rest of Ch. 4, is consistent with Aristotle's definition of nature in *Ph.* 2.1, see the *Introduction* to Ch. 4 (p. 77). Simplicius (1209.26–1210.22), following Alexander, identifies three arguments here, one from the restriction of self-movement to animals (255a6–7), another from elemental movement's unidirectionality (255a7–11), and the third from the elements' structural simplicity (255a12–18); similarly Furley (1994/1978, p. 3). Zekl (p. 285 ns. 51 and 52) lists only the first two, apparently assimilating the second and third. Aquinas (8.1026–1028), followed, e.g., by Duns Scotus (see King, pp. 237, 286–289) claims there are four, adding, with Themistius (218.10–13) at 255a10–11, that if the elements moved themselves, then like animals they could engage in different kinds of locomotion, “walk, leap, dance and move up or down”.

Ross (p. 695), and apparently Waterlow (1982, p. 213, cf. p. 167), also understand 255a10–11 as a separate argument, but differently, that if the elements changed place by themselves, they could also change qualities and quantities. That is the most natural reading of καί (255a10), but not a likely argument: Ross himself notes that *Ph.* 8.6, 259b6–11 asserts animals only engage in locomotion *qua* self-movers, as a simple observation, not an argument against a view that Aristotle could here be assuming dialectically. So with Simplicius (1210.8–14) and Alexander (fr. 584 Rashed) I take “one movement” here to mean “one direction of movement”, referring to fire in the previous sentence, and καί to indicate its sentence is not counterfactual. Cf. similarly Wicksteed (p. 310), although Cornford (1934, p. 310 n. a) suggests as alternatives Themistius’ interpretation, or reordering the text.

The supposedly separate first argument, 255a6–7 is linked closely with what follows both grammatically and in content, and logically supports the claim that self-movement is up to what moves itself (subject to its choice), as I have shown. Graham (1999, pp. 79–81) also recognises just two arguments, without discussion.

In Argument *I* from unidirectionality, I supply Premiss *I.a*, that the movement of things that move themselves is up to them, to integrate into the argument the counterfactual *I.b*, that if fire’s upward movement was up to it, it would also be up to it to move downward (255a9–10). Graham (1999, pp. 79–80) considers that Aristotle treats self-movement, since it involves the ability to move naturally in the opposite direction or to stop, as a rational potency (cf. *Metaph.* 9.2, 9.5, 1048a10–11); but Aristotle employs the more general conception of what is “up to us” (ἐφ’ ἡμῖν, cf. *EN* 3.5, 1113b7–21), which explains why it extends to animals. Moreover Graham (1999, p. 80) finds a *non sequitur* in 255a7–10, between the claim (*I.b.i.i*) that, if something was responsible for its own walking, it would also be responsible for not walking (255a8–9), implying (*I.b.i*) that if an element’s movement was up to it, it could stop itself (255a7), and the inference (*I.b*) that in that case it would be up to fire to move downwards as well as upwards. But this is not problematic (*contra* also Wagner, p. 675): Ross (p. 695) rightly notes, “The power of moving downward may be regarded as a sort of natural corollary of the power of checking upward movement.” Cf. Simplicius (1210.3–8).

Graham (1999, pp. 79–80) also questions how plant growth is related to self-movement and elemental movement, since it seems to be a distinct phenomenon not discussed here; see also Waterlow (1982, p. 211 n. 5). Elsewhere Graham (1996, p. 176) incorrectly proposes that plants here fall into the category of self-movers, but as Freeland (p. 54 n. 36) notes, Aristotle restricts self-movement to locomotion (Ch. 2, 253a14–15; Ch. 6, 259b6–7), and she sug-

gests Aristotle accordingly ignores plant growth here, but its absence still needs explanation. Bodnár (1997, p. 87 n. 7) notes that animal qualitative and other non-voluntary movements are further biological changes ignored here. Aristotle attributes these to the vegetative soul and the heart or analogue containing it (*de An.* 2.4; *GA* 2.1, 735a15–26), and presumably assumes they are initially analogous to the behaviour of an elemental mass, subject to the external causality of a parent and anything incidentally releasing obstructions to growth or alteration (see 255b12–13, b21–24 with *GA* 2.1, 735a12–15), since light and heavy things are apparently just examples of things moved naturally by something else (note the use of *οἷον*, 255a2). Alternatively, Bodnár (1997) notes, in Chs. 2 and 4 Aristotle traces non-locomotive animal changes to environmental causes, which might also apply to plants.

Argument *II*, from the structural simplicity of the elements implies that the heavenly spheres, like other simple, continuous elemental bodies, are not self-moving, as Gill (1994, p. 30 n. 43) recognises. Nussbaum (p. 280) argues against this, but see below on *Ph.* 8.5–6. Yet Gill (1989, p. 236) must be wrong to suggest that the reason Aristotle here describes the elements as continuous, naturally unified and one (255a12–13) is that they are free from weariness and decay (citing *Metaph.* 9.8, 1050b28–30; *Mete.* 4.1, 379a12–16). Here their continuous unity is due to the homogeneity of each elemental mass while it temporarily remains locally cohesive; their unwearying activity consists just in each mass being inevitably soon transformed into another element, and so redirected towards a different natural place.

Note on Ch. 4, 255a18–b24: (A.3.2.2) The Intrinsic Cause of Elemental Movement

Defending his general conclusion in Part *A* of Ch. 4 (that anything in movement has a mover) Aristotle initially here states the overall implication of the solution he will offer to the problem elaborated in Section *A.3.2.1*: even heavy and light things, the difficult case for things naturally moved not by themselves, are moved by something (255a18–19). Section *A.3.2.2* implies the primary reason for this is that an element's natural movement is caused intrinsically by the moving cause of its generation (stated 255b35–256a1; cf. *Cael.* 4.3, 310a32–34, 311a10–12). The argument depends on three premisses, each supported by a sub-argument: (a) that the elements are moved by what activates their natural potential for movement (255a19–30, here Subsection *A.3.2.2.1*); (b) that it is not obvious by what particular cause the elements are moved naturally because there is more than one kind of potential for elemental movement (a30–b13, here Subsection

A.3.2.2.2); and (c) that nevertheless immediately on the action of the cause of generation, if it can, the element engages in its natural movement (b13–24, here Subsection A.3.2.2.3).

As Ross (p. 697) notes, the agent of natural movement, as what generates the elemental mass, is first exemplified at 255a22–23, and b8–11 states the theory of elemental generation; see also *Ph.* 3.2, 202a5–12, *Metaph.* 9.8, 1049b23–27. Accordingly, *contra* Lang (1992, 76–77 and *passim*; see also Lang, 1998, pp. 228, 252–254), Aristotle means the essential agent of fire going upward is a prior hot elemental mass generating a particular mass of fire, in conjunction with the nature of fire, which is to go upward (255b15–17), a form transmitted from the generator as its causal activity (cf. Simplicius 1217.11–17). Thus the agent of fire going upward is not the resultant actuality of fire in its proper place, nor that proper place as such (*contra* Lang, 1998, p. 253 n. 61, citing Philoponus, Simplicius and Themistius in support; cf. also Freeland, p. 54), since these each fail to meet one or both of two conditions for an agent (cause of movement): it must actually exist *before* it affects a subject which is potentially, and not actually so, and it must *touch* that subject (*Ph.* 3.2, 202a6–12).

Lang (1998, p. 254) argues that because an elemental mass is somewhere, and place is continuously determinate for Aristotle, it is always in contact with its proper place, but that is a fallacy of transitivity; cf. the criticism by Graham (1996, pp. 78–80) and (1999, pp. 85–86). Graham's misgivings with Aristotle here seem based on the mistaken assumption that he treats a cause of movement as a sufficient, not a necessary, condition for natural movement (see Graham, 1996, pp. 177–178, 181–186). Gill (1989, p. 235) unnecessarily interprets *Metaph.* 9.8, 1050b28–30 (attributing to the elements change in virtue of themselves: καθ' αὐτά) inconsistently with the present point, understanding καθ' αὐτά to imply the absence of any external mover; but this phrase means elemental movement towards their natural place is their intrinsic (natural) tendency, as here (255a2–4, b15–17): this passive potential does not exclude an agent with active potential. Bodnár (1997, pp. 93–101) criticises Lang and Gill further. Both Menn (p. 435 n. 22) and Katayama (p. 177) argue the generator is only an intrinsic cause of elemental movement when the mass is not generated in its proper place, and anything that moves a pre-existing mass away from that is the intrinsic cause of its return (contrast Philoponus 829.29–31).

Ch. 4, 255a18–30: (A.3.2.2.1) What Activates a Natural Potential

Well then, it turns out that even these things are always moved by something. This might become obvious if we distinguish the causes. It is also

255a18
a20

possible to apply what has been said to the case of the things that incite movement. For some of them are capable of inciting movement unnaturally, as a lever is not naturally capable of moving what is heavy, whereas some are naturally capable, as what is actually hot is capable of moving what is potentially hot, and similarly in all other cases like these. And
 a25 what is potentially of some quality or some amount or somewhere is similarly naturally capable of being moved, when it contains such a principle within itself not incidentally (for the same thing could be both of some quality and some amount, but the one is incidental to the other and does not belong to it intrinsically). Accordingly fire and earth are moved by
 a30 something by force when they are moved unnaturally, but naturally, when being potentially so-and-so, they are moved to their own actualities.

Analysis

To show the elements are moved naturally by something (255a18–19), Aristotle here establishes that this is what activates their natural potential for movement (supplied), since (a) natural potentials for movement require a cause to activate them (supplied), because (a.i) corresponding to the distinction between things moved naturally and unnaturally, there is a distinction between natural and unnatural causes of movement (255a19–21); and (a.ii) such natural causes are required to activate the corresponding potential to be moved (supplied), since (a.i/ii.i) a lever moves something else unnaturally, but what is actually hot activates what is potentially hot, and similarly in all other cases of what is active corresponding to a similar natural potential (255a21–24, cf. GC 1.7, 324a9–14) – while (b) fire and earth are moved by force unnaturally, but naturally when being potentially so they are moved to the corresponding actualities (activities) (255a28–30), because (b.i) everything naturally movable is potentially of some kind or size or somewhere and it has the potential as an internal principle not incidentally (255a24–26), since (b.i.i) it is possible, for example, for something of a certain quality to be incidentally of a certain quantity, or vice versa, but it is not naturally movable in the latter respect (cf. 255a26–27), because (b.i.i.i) the attribute does not belong to it intrinsically in that respect (cf. 255a27–28); and (b.i.i.ii) what is natural is intrinsic to something (supplied).

Commentary

The key premisses stated here are (a.i/ii.i) that in nature there must be an active cause corresponding to a potential to be moved, and (b) that in the elements (and light and heavy things generally) there is a natural potential to be moved. Aquinas (8.1029, cf. 1035) shows that the present section effectively justifies the doctrine of the natural moving cause against the objection that in

Ph. 2.1 Aristotle says natural change does not require an external mover (*contra* e.g. Graham, 1999, pp. 76–77): immediately the concept of nature is explicated through potentiality and actuality, it becomes clear there must be a moving cause: nothing can be in potentiality and in activity at the same time in the same respect (cf. Simplicius 1211.31–37, and 1217.34–1218.19 on 255b30–31). The principle behind Aristotle’s conception of a natural cause of movement is that movement is an activity (actuality), and the source of that activity (actuality) must be in some already active (actual) cause (*Ph.* 3.3, 202a16–17, *Metaph.* 9.8, 1049b17–1050a3, 12.6, 1071b12–1072a9).

Alexander (fr. 590 Rashed, ap. Simplicius 1213.3–17; cf. Philoponus 830.13–19) explains the term ‘actualities’ in Premiss *b*, “when being potentially so-and-so, they are moved to their own actualities” (255a28–30), as referring to the elements’ proper places as such, whereby, in his words, being in their proper places is their fulfilment (τελειότης, *teleiotes*). Lang (1992, e.g., p. 73, and cf. pp. 76–77, appealing to 255b11) apparently agrees with Alexander. Simplicius (1212.34–1213.3) disagrees, explaining elemental activity here as movement *towards* each element’s proper place, which he understands as the outcome of generation. Graham (1999, p. 82) apparently takes Simplicius’ position. Nevertheless Alexander (fr. 591 Rashed) shows that Simplicius (1213.4–6; but cf. 14–16) slightly misrepresents him, since he does not deny the actuality of an elemental mass not yet in its natural place (see Rashed, pp. 523–525, citing Simplicius *In de caelo* 22.18–33, and cf. Philoponus 830.25–26). Aristotle speaks apparently indifferently about being in, or movement towards, its natural place as the element’s activity (actuality), while 255a30 supports Alexander (and see similarly 255b8–12, a passage clarified by Ross’s punctuation, where Simplicius 1216.1–10, has to adopt Alexander’s view). Katayama (pp. 166–169) reconciles Aristotle’s various statements, many in *Cael.*, distinguishing precise and imprecise formulations, the former defining an element’s actuality as rest in its natural place, the latter as its potentiality to move there (citing *Cael.* 1.3, 269b20–26 and 4.3, 311a2–6, *vis-à-vis* respectively *Ph.* 8.4, 255b15–16 and b11 below).

Notes

At 255a19–21, here *a.i*, Aristotle refers to a previous division of things moved, at 254b7–14, where he specifies that things moved either intrinsically or incidentally are moved, respectively, by an intrinsic or incidental mover, and by implication he now means that things moved intrinsically either naturally or unnaturally are moved, respectively, by their natural or an unnatural mover.

At 255a21–22, in *a.i/ii.i*, Simplicius (1211.25–31) explains the unnatural agency of a lever, followed by Graham (1999, p. 82), as resulting from something external

to the mover, by contrast with natural movers, which work in virtue of a causal principle internal to the mover, for instance fire burning (255a22–23). This may be a necessary condition but it cannot be sufficient, since Aristotle here means that the natural cause of elemental movement is external, but that may result from agency by a further elemental mass, itself externally moved.

At 255a26–28, here *b.i.i* and support, Aristotle clarifies what is incidental (τὸ κατὰ συμβεβηχός, *to kata sumbebēkos*): “the same thing is both of a certain quality and amount, but the one belongs incidentally to the other, not intrinsically”. Simplicius (1212.1–8) explains that something, because of its actual quality potentially of a different quality, may become incidentally a certain *amount*, but insofar as it was originally of a certain quality it had no potential to become an amount, nor is it intrinsically changeable in amount, but only because of its incidentally previously being of a certain amount. Similarly a sticky liquid might be heatable, for instance, but not *qua* sticky, only *qua* cold. Cf. *Metaph.* 5.7, 1017a7–22, cf. 5.30, 1025a19–24.

Ch. 4, 255a30–b13: (A.3.2.2.2) The Double Potentiality for Elemental Movement

255a30 *But the fact that what is potentially has more than one meaning is responsible for it not being obvious what things like this are moved by, such as fire being moved upwards and earth downwards. The man learning, and the man who already has the knowledge but is not active, are potentially*
a35 *cognisant in different ways. When what is capable of acting and capable of being affected are together, what is potentially so-and-so always*
255b1 *becomes actually so-and-so,¹ as that which learns, from being potentially so, becomes potentially something other (for the man with knowledge but not contemplating is in a way potentially cognisant, but not in the same way as before he learned), but when he is in this condition, if nothing prevents it, he is active and contemplates, or else he is in the contrary*
b5 *condition,² that is, in ignorance. This is similar also in the case of natural things. For what is cold is potentially hot, and when it changes it is now*

1 Omitting ἐνίοτε (255a35) with Ross.

2 Thus Ross (p. 696) for ἐν τῇ ἀντιφάσει (255b4–5); Alexander (fr. 593 Rashed; cf. Simpl. 1214.26–32) understands “in a self-contradictory situation”, and *not* simply ignorant. See further Rashed (pp. 528–529).

fire, and it burns (something) unless something prevents and obstructs it. It is also similar concerning what is heavy and light. For from being heavy it becomes light, as from water does air (for it was first this potentially), and now it is light and is immediately active, unless something prevents it. But the activity of what is light is being somewhere, that is upward, and it is prevented when it is in the opposite place. And this is similar also in the case of a certain amount, and a certain quality. b10

Analysis

Having just shown in 255a18–30 (here A.3.2.2.1) that elemental movement must have some cause which activates the potential, Aristotle here explains why this is not obvious, that there is more than one kind of potential for elemental movement (255a30–33), supported with an argument by analogy from knowing, that (a), for instance, from being potentially cognisant the learner, when he learns, becomes different potentially (255b1–2), because (a.i) in different senses both the man learning and the man with knowledge who is not active are both potentially cognisant (255b2–3, cf. a33–34) – although (b) once having learned he is immediately active and contemplates, whenever nothing prevents it (255b3–5), because (b.i) whenever what can act and what can be affected are together, what is potentially so becomes actually so (255a34–b1); and (c) the same kind of thing happens in nature as in knowledge (255b5–6).

Premiss c, effectively that there is also a double potential in natural things, is then independently supported by another complex argument, (c.i) that what is cold is potentially hot, and when it changes, it is then fire, and burns things, unless something obstructs it (255b6–7); and (c.ii) the case is similar concerning what is heavy and light (255b8), because (c.ii.i) what is light comes to be from something heavy (255b8–9), since (c.ii.i.i), for instance, air comes to be from water (255b9), because (c.ii.i.i.i) water previously was potentially air, and light (255b9–10) – and (c.ii.ii) once it has come to be, the air is light, and will immediately be active, unless something prevents it (255b10–11); but (c.ii.iii) air is also potentially light (supplied), because (c.ii.iii.i) the activity (actuality) of what is light is being somewhere, that is, upward (255b11); but (c.ii.iii.ii) when it is in the opposite place, what is light is prevented from being active, i.e., in its proper place (255b11–12) – and (c.iii) the same kind of thing happens in nature when quantity or quality are generated (255b12–13).

Commentary

In the argument's first part, 255a33–b5, demonstrating there are two kinds of potential, Aristotle first states the two ultimate grounds, (a.i) the distinction

between two kinds of potential for knowledge (a33–34) and (*b.i*) the claim that activation is immediate once the cause is in contact with the potential (a34–b1); thereupon with οἷον (255b1) he begins presenting the whole argument through the example of the learner, with Premisses (*a*) that the learner has a different potential once having learned (b1–2), supported by *a.i* repeated, and then (*b*) that this second potential is immediately activated unless prevented (b3–5), not stating explicitly that this follows from *b.i* above. From *a* and *b* the conclusion follows immediately, that in such cases there is a double potential (255a30–31); we are left to infer from this and the conclusion of *A.3.2.2.1* (255a18–30) above (that a cause is required to activate a natural potential), that, therefore a cause must activate a second potential (e.g., air's, once generated, to rise upward: 255b10–11). Additionally, since the second potential, unless obstructed, is immediately activated, it is not obvious what the cause was, since no other cause apart from the cause of generation has been involved. Thus the cause of generation is also that of movement, activating both potentials, the first to become light or heavy, and the second immediately to move upward or down; cf. similarly Ross (p. 697).

Waterlow (1982, pp. 167–168), citing Simplicius (1220.9–11), regards Aristotle as here weakening his criteria for an intrinsic cause of movement from *Ph.* 3.2 (see 202a6–12) because the agent generating an elemental mass is not contemporary with the effect to be explained (the locomotion). I take it, rather, that Aristotle shows here that the agent actualising the first potentiality of a given elemental mass (generating the elemental mass from some other) is also thereby the intrinsic agent actualising the second potentiality, that to move towards that element's proper place, since, unless obstructed, that kind of potential is immediately activated (cf. Katayama, pp. 171–173, and Wagner, p. 676). Gill (1989, p. 237) provides an explanation of this passage concluding, on the contrary, that Aristotle means that the element's movement to its proper place is subject to no external agent at all because it moves in virtue of itself (καθ' αὐτά, *kath' hauta*, i.e., intrinsically), but see the *Note* above on Ch. 4, 255a18–b24 (pp. 90–91); thereafter Gill (1989, p. 238) acknowledges that Aristotle identifies the generator of the agent as the external mover, but asserts, contrary to the text, that the generator is merely an accidental mover: see further the *Introductory Note* on 255b24–31 below (p. 100).

See Ross (pp. 696–697) for a brief explanation of Aristotle's distinction between first and second potentials, and cf. especially *de An.* 2.1, 412a22–26 and 2.5, 417a21–418a6. The exact interpretation of the metaphysical implications of the distinction is subject to disagreement. Ibn Rushd (*LC* 367E7–H2 and *SC* 137.8–139.12, cited by Lettinck, respectively pp. 664 and 652–653), presumably inferring from the present context, suggests that second potentials are

incidental, resulting only from obstruction, and only first ones intrinsic, but it is not clear that the *de An.* passages support this. Zekl (p. 285 n. 55) refers to *Metaph.* 5.12, 1019a15–1020a7, but although here (255a30–31) Aristotle asserts universally that the expression “what is in potential” is ambiguous, no other senses from *Metaph.* 5.12 are relevant in what follows (cf. Lang, 1998, p. 231). Lang (1998, pp. 249–250, cf. 228) paraphrases the passage 255a30–b31, arguing it is consistent with *Cael.* 4.3. Waterlow (1982, pp. 168–169) claims that it is a weakness of the analogy with the actualisation of knowledge that the latter involves no movement, and is caused by the subject itself, and consequently Aristotle here infers elemental movement has an external cause only from the fact that it is movement; but if so, that would involve him in a *petitio principii*. Yet this is wrong, since the actualisation of knowledge (inclusive of learning) does have an external cause analogous to the generator of an elemental mass, the teacher. See Graham (1999, pp. 83–84) with Katayama (pp. 174–175) on the remaining differences.

Notes

At 255a35, here *b.i.*, the claim that, whenever what can act and what can be affected are together, what is potentially so becomes actually so, Ross (p. 696) deletes ἐνίοτε (‘sometimes’), which is awkward after ἀεί (‘always’), but cf. Simplicius (1214.9–21) and Cornford and Wicksteed (p. 312 n. *a*), and Wagner (p. 675, supporting Ross). ἐνίοτε was missing in some ancient texts although Alexander (fr. 592 Rashed; cf. Philoponus 830.27–30) explains it in terms of the additional requirements for sufficient time and choice in rational action. Whether he is correct or not is insignificant for the claim’s role, since Aristotle clearly thinks that when all relevant conditions are met, the action of a cause of movement is automatic (cf. *Metaph.* 9.5, 1047b35–1048a21), which is what the argument here requires.

On 255b3–5, here *b.*, the claim that, having learned, a man is active and contemplates when nothing prevents it, Wicksteed (p. 314 n. *a*) adds “not continuously, but whenever he sees sufficient cause”; yet Aristotle thinks there is always sufficient cause for *theoria*, as the highest human good. Anything distracting thus counts as an obstruction, although not necessarily one that should be ignored; cf. similarly Gill (1989, p. 237 with n. 59).

On 255b6–7, here *c.i.*, the claim that when something potentially hot becomes fire and burns unless obstructed, Ross (p. 697) notes that having become fire exemplifies the second potential, and burning things the corresponding activity. Aquinas (8.1031–1033) considers this case to explain potential in relation to

alteration, and the following case (255b8–12) potential in relation to locomotion, as the first example (255a35–b5) did potential in relation to the intellect. But quality is referred to below at 255b12–13, which suggests that Ross by contrast is right to link the generation of fire with the case of elemental movement following (cf. Simplicius 1215.11–12).

Ch. 4, 255b13–24: (A.3.2.2.3) The Immediacy of Elemental Movement

255b13 *Yet what is sought is why light and heavy things are moved to their own*
 b15 *places. The reason is that they are naturally directed to somewhere, and*
 that is the essence of light and heavy, the one defined by being upward,
 the other by being downward. But something is potentially light or heavy
 in more than one way, as has been stated. Both when it is water, it is in
 one way potentially light, and when it is air, it is still in a way potentially
 b20 *light. For if it is obstructed, it may not be upward,³ but if what obstructs is*
 removed, it is active and every time it becomes further upward. Similarly
 too, what is of a certain quality changes to being actually so. For that
 which is cognisant immediately contemplates unless anything obstructs
 it. And what is a certain amount is extended unless something prevents
 it.

Introductory Note

Here Aristotle concludes his argument that there is a moving cause of natural elemental movement, which overall shows that since the generation of an elemental mass intrinsically results in its movement up or down, the cause of generation is the intrinsic cause of this movement (and so, by implication, its natural cause). In particular, here Aristotle shows that elemental movement upwards or downwards is the direct result of generation, even if delayed.

Analysis

The implication of this passage is that as soon as the cause of their generation has acted, heavy and light things engage in natural movement as far as they can (supplied), since (a) their natural movement is to their proper places (cf. 255b13–15), because (a.i) their nature is to go somewhere (b15), because

3 Removing Ross's parentheses at 255b19–20, and replacing the following raised point with a comma.

(*a.i.i*) that is essential to each (255b15–16), since (*a.i.i.i*) what is light is defined by being upward, and what is heavy by being downward (255b16–17) – and (*b*) as soon as their potential for that place is activated they engage in their natural movement (supplied: see 255a18–b13, here *A.3.2.2.1–2*); but (*c*) they are potentially light or heavy in more than one sense, as previously explained (255b17–18, cf. a30–31), because (*c.i*) water is potentially light in one sense, and air is still potentially light in another (b18–19), since (*c.i.i*) it is possible for air not to be upward if it is obstructed and each time an obstruction is removed, it actively travels further upward (255b19–21, cf. b10–11); and (*c.i.ii*) a quality changes into its actual state in the same way too (255b21–22), because (*c.i.iii.i*) (similarly) what is cognisant immediately contemplates unless prevented, and a quantity is extended unless prevented (255b22–24, cf. b3–5, b12–13).

Commentary

The key to the explanation here, which otherwise is just a restatement of the results of the previous section, is the support for *a*, the claim that light and heavy things have a natural direction of movement (255b15) provided by *a.i* and *a.i.i* appealing to the essence, as the nature of what is either heavy or light, to explain the direction of its movement (255b15–17). Sorabji (1988, p. 220 with n. 7, cf. pp. 244–245 with ns. 78 and 83) and Zekl (p. 286 n. 61) seem wrong to suggest that 255b13–17 (here *a* and support) treats the internal nature of an elemental mass moved to its proper place as satisfying the requirement for a cause of movement in contact with what is moved, since the nature is responsible not for the continuous activation of movement, as a cause in contact is meant to be, but rather its direction. The continuation in 255b17–24 (here *c* and support), makes clear that the kind of contact the elemental mass has with what generates it is the relevant kind for a cause of movement: the movement to the proper place is ideally quasi-instantaneous (cf. Wedin, pp. 95–96), or at least inseparable in practice from the generation, unless obstructed, and presumably normally occurs in continuing contact with the natural generator, which is a mass of either the same element or at least with the same directional potential (i.e., hot, and so light, or cold, and so heavy: see *GC* 1.7, 324a9–14 with 2.4).

Note

255b23–24, here *c.i.iii.i*, the claim that what is a certain amount is extended, unless something prevents it, is explained by Ross (p. 697), following earlier commentators, in terms of a compressed body which, once unobstructed, expands, and so is no longer merely potentially, but actually, a certain amount.

Ch. 4, 255b24–31: (A.3.2.3) The Incidental Cause of Elemental Movement

255b25 *In one way someone who moves what is in the way and prevents movement moves (what was previously obstructed), but in another way he does not, such as someone who pushes a column out of the way or who removes a stone from a wineskin (filled with air) under water. For he moves (what was obstructed) incidentally, just as a rebounding ball is moved not by the wall but by the thrower. Well then it is clear that none of these moves itself,*
 b30 *yet has a principle of movement, not of inciting movement or of acting, but of being affected.*

Introductory Note

Here Aristotle concludes his explanation of elemental movement (254b33–255b31), having previously shown that it is not self-movement (255a5–18, Section A.3.2.1), and that the intrinsic cause is what generates the elemental mass (255a18–b24, Section A.3.2.2). Elemental movement is the last of the three cases from which he shows that there is always a cause of movement, following, in Sections A.2 and A.3.1, together above, unnatural movement (254b24–27) and animal movement, *qua* self-movement (254b27–33); he treats both animal and elemental movement as kinds of natural movement. For clarity, the present passage should be read together with the following chapter summary, especially 255b35–256a2:

255b35 *... also those not moved by themselves, such as light and heavy things (sc.*
 256a1 *are moved by something), since they are moved either by what generates them and makes them light or heavy, or by what releases things that obstruct and prevent their movement, ...*

Analysis

Together these passages claim (a) the natural movement of an element is caused in one sense by whatever removes any obstruction hitherto preventing this movement, but in another sense not (255b35–256a2, cf. 255b24–25); and (b) similarly in one sense someone pushing a column away causes what it supports to fall, or someone removing a stone from a wineskin (full of air) underwater causes it to rise to the surface, but in another sense does not (255b25–26), both *a* and *b* because (a/b.i) what removes an obstruction only incidentally moves something whose movement the obstruction prevented (255b27); and (a/b.ii) in the same way the rebounding ball is not moved intrinsically by the wall but the thrower (255b27–29) – while (c) the elements (and things like them: see

Commentary below) have only an internal passive principle of movement, since (*c.i*) they lack an active principle of causing movement (255b30–31), because (*c.ii*) they do not move themselves (255b29).

Commentary

Gill (1994, p. 31; cf. 1989 p. 238) incorrectly states that the first passage (255b24–29) asserts what generates the element is merely its incidental mover, but the passage only refers to what removes an obstruction. The same mistake is apparently implied by Meyer (p. 77 with n. 20) and Berryman (p. 88). Nussbaum (p. 322) thinks Aristotle means an incidental cause of movement removing an obstruction is something alive (see 256a1–2 in the second passage), but this most naturally refers to one elemental mass freeing up another.

Notes

At 255b27–29, here *a/b.ii*, Aquinas (8.1035) explains the wall as an incidental cause because it does not give the ball any *impetus*, only the thrower did. Yet Aristotle does not explain movement by impetus (*hormē*): cf. *Ph.* 8.10, 266b27–267a20 on the movement of objects thrown. The concept of impetus provides an alternative to Aristotle's explanation: see Philoponus 641.15–16, 642.4–26, with 639.15 (cf. 21), where Philoponus replaces Aristotle's "power to incite movement" with "impetus of what is thrown" (ἡ ὀρμὴ τοῦ ῥιφθέντος), and cf. 831.27–33. The concept was perhaps originally Stoic (cf. Sambursky, p. 62).

255b29–31, here *c*, *c.i* and *c.ii*, explaining things previously mentioned as only containing a passive principle of movement, refers only to "the heavy and the light", the elements and their combinations, and does not generally reject all self-movement: thus Furley (1994/1978, p. 7), contrary to earlier scholars. From 254b33 the topic is a division of things moved, differentiated from animals as self-movers, and 255a1–2 introduces the elements exemplifying this final division. The potential antecedents for 'these' (τούτων, 255b29), are, from the closest: the ball (b28), the wineskin (b26), what the column supports (b25), the compressed body (b23), the expert's potential intellect, as what contemplates (b23, however its relations to its objects and the active intellect in *de An.* 3.5 are explained), then a potential quality activated (b21–22), the elements (b5–21), the potential knower (a33–b5), the elements (a28–33), any potential quality or quantity (a24–27), the elements (a22–23). Everything else here has been introduced as a parallel for the elements in one respect or another; the only possible self-mover present would be the potential knower or expert, but he is only there to model the two kinds of potential (see 255a33–34) and the

immediate activation of second potentials (b3–6, 22–23), not, in particular, the principle of external causation (*contra* Shields, p. 123 with n. 5; cf. Wedin, pp. 84–90).

At 255b30–31, here *c*, the principle of being affected is presumably the passive potential for movement. Aristotle probably does not mean the potential of, say, water, to become light and rise because of what generates air from it, since that is not a principle of movement in the air, as such. Yet, assuming he means a principle of movement in the air, as its potential immediately to rise, then if movement is obstructed, it will not involve immediate contact between the intrinsic mover and moved, producing a difficulty how the air is *being affected* (presupposing the immediate activity of an agent)—πάσχειν might here just mean ‘to undergo’ (movement), but the proximity of ποιεῖν suggests not. Moreover for Aristotle to admit a lack of contact between mover and moved during movement would be paradoxical (cf. his explanation of thrown objects, *Ph.* 8.10, 266b27–267a20). This is apparently the reason for the focus on the incidental mover: it vicariously satisfies Aristotle’s general requirements for a mover contemporaneous and in contact (mediated *via* the obstruction), as do the motive parcels of air for thrown objects. With points addressed individually above and some other concerns about the coherence of Ch. 4’s doctrine, see further Simplicius (1220.5–26), and Waterlow (1982, pp. 167–169). Graham (1999, p. 89) claims Aristotle needs the result that the intrinsic mover is always in direct contact with the moved body to argue for an unmoved mover, but actually all he needs from Ch. 4 is that there always is a mover, so no movement will be uncaused (and that the mover is in contact unless movement is obstructed, in which case what releases the obstruction is in mediated contact).

Ch. 4, 255b31–256a3: (B) Conclusion to the Chapter

255b31

Accordingly, if everything moved is moved either naturally or unnaturally and by force, and everything moved by force and unnaturally is moved by something, that is by something else, and, again, among things moved naturally both those things moved by themselves are moved by something, and also those not moved by themselves, such as light and heavy things (since they are moved either by what generates them and makes them light or heavy, or by what releases things that obstruct and prevent their movement), then everything moved would be moved by something.

b35

256a1

Analysis

This summarises the results of Aristotle's argument in Ch. 4: everything moved is moved by something (256a2–3; cf. 254b7–14), because (a) everything moved is moved either naturally or unnaturally (255b31–32; cf. 254b14–24); and (b) everything moved unnaturally, by force, is moved by something (255b32–33; cf. 254b24–27), since (b.i) that is moved by something else (255b33) – while (c) everything moved naturally is moved by something (supplied), because (c.i) what moves itself is moved by something (itself, 255b33–34; cf. 254b27–33); and (c.ii) light and heavy things (the elements and their compounds) are moved by something (255b35; cf. 254b33–255b29), since (c.ii.i) they are moved by what generates them or removes an obstruction (256a1–2).

Commentary

The result that everything moved is moved by something enables Aristotle to argue in Ch. 5 that all chains of movers each causing another movement must originate with a first cause, either something which moves itself, and thereby something else, or something unmoved that moves something else, and that either way, since what moves itself contains an intrinsically moved and an intrinsically unmoved part, all causal chains originate from an intrinsically unmoved mover. This will lead in Ch. 6 to the inference that there must be an everlastingly and completely unmoved mover for the first movement in the cosmos, putatively the everlasting rotation of the sphere of the fixed stars. In Chs. 7–9 he argues that the first, everlasting, movement that explains how movement in the cosmos is everlasting (see Chs. 1–2) must be such a rotation, and in Ch. 10 he solves remaining problems about the nature of the prime mover and its relation to the first body. Aristotle will thus solve all the problems raised in Chs. 2–3 and demonstrate, as he sets out to do in Ch. 3, that in addition to temporarily moving and resting beings there are also both everlastingly moving and everlastingly resting ones.

Unmoved First Causes of Movement

Introduction to Chapter 5

Aristotle here first investigates chains of moved movers concerning their source. As Wieland (pp. 314–315) notes Aristotle conceives of ‘links’ in such chains acting each upon the next simultaneously (unlike the sequential collisions of billiard balls, sometimes used to model Newton’s laws of motion). But whereas *Ph.* 7.1 similarly argues for a first *moved* mover in a chain (242b71–72), the main result of the present chapter is that in any such chain the first mover overall must be unmoved, and the initial result that there must be a first mover, as such, in any chain is not strongly emphasized (see 256a4–13 below, with *Commentary*, pp. 105–107).

This chapter is often said to demonstrate that every movement derives ultimately from a self-mover, and a self-mover contains an unmoved mover and moved part, e.g., by Graham (1999, pp. 89, 96, 185 [V.A]), Gill (1994, p. 16), Waterlow (ch. 5, esp. pp. 236–239 and 257), and Wieland (p. 336 with n. 1), following Simplicius (e.g., 1221.35–38, 1247.27–32). That is then sometimes connected with the conclusions of Ch. 6, that animals are not completely independent self-movers and that at least one everlasting unmoved mover moves the cosmos, to conclude that this latter must be part of a self-moved whole, in conjunction with the body of the first celestial sphere (cf. Kosman, 1994b). This view has been opposed by Aquinas (8.1040 ad fin.), and more recently Lang (1998, pp. 177–180, 258–259 n. 82); cf. Sorabji (1988, pp. 222–223).

There are actually passages in the text showing that only perishable animals are self-movers for Aristotle (Ch. 4, 255a5–11, and Ch. 6, 259b20–22, b28–31, cf. 259a31–b20); moreover Ch. 5’s argument nowhere rules out an external unmoved mover. The focus on a self-mover here is better understood as *ad hominem*, given the prominence of Plato’s definition of the soul as “what moves itself” (*Phaedrus* 245e7–246a1) and “self-moved movement” (*Laws* 10.896a3–4, cf. 895b3–6). Aristotle’s overall rhetorical aim is thus to argue that, even if Plato were right that some self-mover caused all movement in the cosmos, nevertheless, an unmoved mover would still be a first cause prior to such a composite; but as it is, the first cause of all movement must be absolutely unmoved, and so not part of a self-moving whole, since then it would be incidentally moved. See further Blyth (2015).

The chapter divides structurally into three general parts: Part *A* (256a4–13) is quasi-definitional, establishing what a first mover is, the ultimate and overall cause of a movement; Part *B* (256a13–b24 and 256b27–258b9) argues at length that a first mover must be intrinsically unmoved; and Part *C* (256b24–27), appeals to Anaxagoras for confirmation. Part *B* takes up most of the chapter, containing two overall arguments: Argument *B.I* (256a13–b13 & 256b27–258b7) contains extended support for two top-level premisses, (*B.I.1*) that if a chain of moved movers does not lead back directly to an unmoved mover, it must lead to a self-mover (256a13–b13, 256b27–257a31), and then (*B.I.2*) that a self-mover in any case divides into an intrinsically unmoved mover, and an intrinsically moved part (257a31–258b4); Argument *B.II* again establishes that the first mover is unmoved, by an analysis of principles (256b13–24). The passage 256b13–27, containing the latter and then Part *C*, has become dislocated from its proper place in the chapter (see further *ad loc.*, pp. 155–156). Seeck (p. 138) provides a very brief summary essentially agreeing with this, and Aquinas (8.1037) correctly describes the overall structure of the chapter, but differs over some relations among individual arguments and their specific results.

For the relation of Ch. 5 to the rest of *Physics* 8 see the *Commentary* to the conclusion of Ch. 4, final paragraph (p. 103), the general *Introduction* to *Ph.* 8 (pp. 8 and 10–13), and the *Commentary* on Ch. 3 overall.

Ch. 5, 256a4–13: (*A*) First Movers

This (i.e., that everything moved is moved by something) is the case in two ways. For each thing moved is moved either not because of the very thing that incites the movement, but because of another thing that moves what incites movement, or because of that very thing (that moves it), and this is either the first thing after what ultimately moves it,¹ or through a number of intermediaries, just as the staff moves the stone, and is moved by the hand moved by the man, while he no longer incites movement by being moved by something else. We say both incite movement, both the first and last movers, but more so the first. For that moves the last, but this does not move the first, and without the first the last will not incite movement, but that will without this, just as the staff will not unless the man moves it.

5, 256a4
a5
a10

¹ I.e., the immediately adjacent agent to what is ultimately moved.

Introductory Note

Ch. 5, continuing directly from Ch. 4, begins by referring back to the latter's result, that everything moved is moved by something. Aristotle specifies two ways in which a mover may move what is moved, (A.1) either immediately or through one or more intermediaries (256a4 and a8–10). In 256a4–10 this is explained and justified, and then 256a10–13 makes a separate point, (A.2) that the first mover is more properly the mover of what is ultimately moved than any intermediate movers (256a10; cf. *Metaph.* 2.2, 994a3–19).

Analysis

Aristotle distinguishes (A.1) between an immediate and a mediated mover (256a4, a8–10), since (1.a) an immediate mover moves something either because of itself or because of another mover moving it (256a4–5); while (1.b) the thing *because of which* something moves something else itself moves that last thing (supplied); and (1.c) another mover moving the immediate mover may itself act immediately or through intermediaries (256a5–6), because (1.c.i), for instance, a stone is moved by a staff, which is moved by a hand, moved by a man (256a6–8); while (1.c.ii) in this case the man moves the stone because of himself (supplied), since (1.c.ii.i) the man does not move the stone by being moved by anything else (256a8).

Aristotle then argues (A.2) that a first mover is more properly a mover than any intermediaries (256a10), because (2.a) without the first mover, the last will not move anything, but the first will move something without the last (256a11–12), since (2.a.i) the first moves the last mover, but the last does not move the first (256a10–11); and (2.a.ii), as in the example above, the staff will not move the stone unless the man moves it (256a12–13).

Commentary

In A.1, as that because of which the stone is moved, the man is a mover of it, by 1.b, but not an immediate mover; accordingly in addition to immediate movers there are also mediated ones. In A.2, as the first of the mediated movers the man is more properly the mover, since, by 2.a, it alone is a sufficient condition for movement.

Ross (p. 437), Solmsen (1960, p. 231 n. 30, cf. p. 234 n. 40), and cf. similarly Zekl (p. xl), follow Simplicius (1220.29–1222.23) in treating the whole of 256a4–21 as a single argument that there must be a first, self-moved, mover of all movement; for a13–21 see rather the next section below. See Blyth (2015, Ahead of Print p. 4; cf. p. 7) for further discussion of Simplicius' detailed treatment, apparently confusing what incites movement because of itself (referred to only at 256a4–5, here 1.a) with what moves itself (1225.35; cf. 1225.18–20, 24–28); see rather 1.b

(supplied) for the logical role of the former term. In 256a4–13, the case of the man moving a stone with a staff is used only to exemplify a first mover, not a self-mover as such (*contra* also Waterlow, 1982, p. 231 n. 16 and Meyer, p. 66).

More generally, Aquinas (8.1037 *in fin.*) also thinks 256a4–13 sets out premisses used subsequently in the argument at 256a13–21 below to prove there is a first mover. Partly similarly, Graham (1999, p. 89) describes Aristotle as making in 256a4–13 the distinctions required to argue at 256a13–21 that movers that do not initiate movement presuppose those that do, and then in the following argument (256a21–b3) that among those that do, remote movers presuppose immediate ones.

Aristotle's extremely concise expression tends to obscure his reasoning, and among possible reconstructions I give what seems to me closest to the text while still supporting the conclusion of the following section at 256a19–21. Yet since he does not appeal in 256a13–21 to any stated conclusion in 256a4–13, it is preferable to present the earlier passage as an independent section. Nevertheless, 256a10–13, here A.2, has the unstated implication that if there is movement there must be a first mover: see especially 256a11–12, here 2.a. This conclusion seems to be assumed in the first argument below at 256a15–16 where in the *Analysis* it is supplied, again similarly in the second argument at 256a29, and later at 257b15–16. As Seeck (p. 138) notes, Aristotle treats the assumption of a first mover as unproblematic in Ch. 5, focusing on whether it is intrinsically moved (as are both Plato's candidate, the soul, and Democritus' atoms).

Notes

In paraphrasing 256a4–5, here 1.a, Themistius (220.12) replaces 'because of' (διὰ with accusative) with 'through' (διὰ with genitive) obscuring the centrality of the concept of *that because of which* in establishing the concept of a mediated, or indirect, mover.

Seeck (pp. 162–163) argues that at 256a5–6, here 1.c, the distinction between an immediate and a mediated mover of the ultimate immediate mover was inserted later, because he supposes it is meant to subdivide immediate primary movers, but it cannot, since it divides rather movers that act immediately from those acting through intermediaries. He takes the antecedent of τοῦτο ('this', a5) to be <sc. τὸ κινεῖν> δι' αὐτό ("⟨what moves⟩ because of itself"); but it seems better to take it as <sc. τὸ> ἕτερον ὃ κινεῖ τὸ κινεῖν in the other alternative ("another mover that moves the mover", a4–5) in the preceding distinction, here 1.a, between an immediate mover acting because of itself, and one acting

because of a prior mover; consequently there is no contradiction, and the idea of extended causal chains is established. Solmsen (1967, pp. 14–15) rejects Seeck's proposal by treating the distinction in a4–5 as not between kinds of immediate mover as such, which admittedly is not explicit but makes the best sense, giving a coherent argument.

Aquinas (8.1039), and perhaps Simplicius (1221.20–22), regard 256a10–12, here 2.a and 2.a.i, as containing two reasons for the first mover being more properly the mover (A.2). Apostle (p. 230 n. 3) suggests that if not, they concern alternative cases (non-involvement, or involvement, of intermediate movers). Aristotle links the two with 'and' (καί), but this seems to mean 'and so', since it need indicate only that they are both asserted, not that they are logically co-ordinate, while in fact the second (2.a) follows informally from the first (2.a.i).

Regarding 256a11–12, here 2.a, claiming the first mover is necessary to movement, Graham (1999, p. 90) questions whether a first mover might not (at least sometimes) also require intermediary movers to achieve a given movement. He suggests, probably rightly, that the conception of true and subsidiary causes is derived from Plato (cf. *Phaedo* 99a–b, *Timaeus* 46c–e).

Note on Ch. 5, 256a13–b24 & 256b27–258b9: (B) Unmoved First Movers

For an overview in context of this longest Part of the chapter, see comments on its structure in the *Introduction* (p. 105). Here Aristotle argues that the first mover of any movement is itself intrinsically unmoved (258b4–5, b8–9) with two distinct arguments.

Argument *B.I* is long and complex (256a13–b13, continued 256b27–258b7). It is by reduction of the alternative, since the conclusion follows from two top-level premisses, (*B.I.1*) that if a chain of moved movers does not lead back directly to an unmoved mover, it must lead to a self-mover (256a13–b13, 256b27–257a31), but (*B.I.2*) a self-mover in any case divides into an intrinsically unmoved mover, and an intrinsically moved part (257a31–258b4). Argument *B.II* also establishes that the first mover is unmoved, by analysis of principles (256b13–24). On the dislocation of 256b13–27, here presented at the end of the chapter, see the *Note on location here of Ch. 5, 256b13–27* (pp. 155–156), following *Ch. 5, 258b4–9: general conclusion to Argument B.I for an unmoved mover*.

The justification of *B.I.1*, that causal chains not originating directly from an unmoved mover originate from a self-mover, consists in four separate general arguments:

- (I) from the finitude of a series of movers (256a13–21);
- (II) from the finitude of the means employed (256a21–b3);
- (III) against the universality of external moved movers (256b3–13, 256b27–257a27), itself containing two sub-arguments, (*III.I*) by exclusion of both an incidentally and a necessarily externally moved first mover (256b4–13 and 256b27–257a14), and (*III.II*) by exclusion of contradictory potentials (257a14–25); and
- (IV) from a Platonic assumption, that what moves itself is causally prior to what is moved by something else (257a27–31).

Aquinas (8.1037), recognising only three arguments here, overlooks *IV*, thinking the first two aim at the conclusion that there must be a first mover, and the third that it is unmoved.

Thereafter, support for *B.I.2* (the reduction of all self-movers to a combination of an intrinsically unmoved part and an immediately moved part) involves a series of combined claims of varying centrality to the argument, several supported by sub-arguments, on the topics of:

- (*B.I.2.1*) the initial question (257a31–33);
- (*B.I.2.2*) the physical divisibility of a self-mover (257a33–b1);
- (*B.I.2.3*) the differentiation of mover and moved parts (257b2–13), containing two sub-arguments, from contradictory processes (257b2–6) and from contradictory attributes (257b6–12);
- (*B.I.2.4*) the unmoved mover in a self-mover (257b13–258a5), containing one argument by exclusion of alternatives to show the mover is unmoved, and within that four short sub-arguments to exclude one alternative, that parts in a self-mover do not move each other reciprocally (257b13–26); and one against another alternative, that it contains a self-moving part (257b26–258a1);
- (*B.I.2.5*) the uniqueness of the moved part (258a5–20);
- (*B.I.2.6*) contact between the parts (258a20–22);
- (*B.I.2.7*) the requirement for joint action of the parts (258a22–27); and
- (*B.I.2.8*) the integrity of a self-moving whole (258a27–b4).

Subsequently Argument *B.II* (256b13–24) approaches the ultimate claim that a first mover must be intrinsically unmoved quite differently, with an anal-

ysis of the distinct principles involved in movement (mover, instrument and moved thing), and the functionally essential characteristics of each, confirming empirically the existence of such systems, and so all parts. (This overall difference in approach to supporting the main claim of the long second section of the chapter, that a first mover is unmoved, is part of the evidence that the passage containing it is dislocated in the middle of *B.I.1.III.1* listed above.)

The first main premiss of Argument *B.I* (formally stated once the whole argument is concluded at 258b5–7) is (*B.I.1*) that a series of movers leading back from what is moved, but moved by something in movement, either arrives directly at a first mover that is unmoved, or at something moved, but which moves and stops itself (that is, an animal). Cornford (1934, pp. 318–319, intro. to Ch. 5; and cf. Wagner, p. 679 on 257b31–33) rightly notes the general conclusion of the first set of arguments here, *I–IV* above, is that a series of moved agents must terminate in one *either* unmoved *or* self-moved. The qualification that the first mover is self-moved only if it is moved, not an external unmoved mover, occurs at 256a20 in Argument *I*, 256a33–34 in *II*, 256b4–5 and 257a26–27 in *III*, and by implication at 257a28–29 in *IV*; it is nowhere asserted generally that there is no external unmoved mover, nor that the first mover of the cosmos is a self-mover, which is in fact excluded on other grounds.

The complex Argument *III* (256b3–13, 256b27–257a27) overall defends the claim that some movers must not be externally moved, not that every series terminates in a non-externally moved mover, although it does include an argument for the constituent case, which is comprehensive for natural movements, that a series of necessarily moved movers cannot be infinite (257a3–14). Consequently in response to Aristotle's disjunctive conclusion at 257a26–27 (that a first mover is either unmoved or self-moved), Furley's explanation (1994/1978, p. 4), that the unmoved mover referred to is merely the mover within a self-mover, is unwarranted, since Aristotle leaves it open that not all causal chains do originate in a self-mover. If they did, that would mean the first heaven, the sphere of the fixed stars was the bodily part of a self-moving whole. But in fact that possibility is contradicted by the implication of 258b5–7 (cf. above) that the kind of self-mover which is presented as an alternative to an unmoved mover here must be exclusively a terrestrial animal, since it is specified there as something which moves *and stops* itself.

In order to support this particular overarching conclusion (*B.I.1*), the subordinate conclusion,

- (**B.I.1.a*) wherever a series does not lead directly to an independent unmoved mover, it leads to a self-mover (256a19–21, a33–b3, b4–5, 257a26–27, cf. b24–25),

to which Arguments *I–IV* together lead more directly, must be supplemented with

- (**B.I.1.b*) any self-mover is an animal, i.e., something that moves and stops itself (supplied: see Ch. 6, 259b20–22, b28–31, cf. 259a31–b20, and Ch. 4, 255a5–11).

Only that would give us what Aristotle effectively tells us at 258b5–7, that any causal chain originates either in an external unmoved mover or in a terrestrial animal (although the analysis ignores this interpretive complication). For Aristotle's account of celestial movement see further Blyth (2015): the argument that the elements are not self-movers in Ch. 4 (by parity of reasoning also applicable to the element of the heavens), and the exclusion of incidental self-movement from the heavens at Ch. 6, 259b28–31, also discussed below, along with 258b5–7, here *B.I.1*, each exclude the attribution of self-movement to the heavens in *Physics* Bk 8. See further the *Introduction* to the chapter (p. 104), *Commentary* on Ch. 2, 253a7–21 (p. 50), *Note* on Ch. 4, 254b15 (p. 82), and cf. 255a5–18 (pp. 87–90), *Commentary* on Ch. 6, 259b1–16 (pp. 181–183) and 259b16–22 & b28–31b, with *Notes* (pp. 186–191).

Ch. 5, 256a13–21: (*B.I.1.I*) Argument from the Finitude of a Series of Movers

Now if (i) everything in movement must be moved by something, and 256a13
either (ii.α') by something moved by something else, or (ii.β') not; and (if a15
it is the case that) (iii), if by something else (= ii.α'), there must be some
first thing inciting movement which is not moved by something else (cf.
ii.β'), and (if it is the case that) (iv), if the first is like this, there must be
no different mover for it (for it is impossible that a series in which each
member itself incites movement while being moved by something else
continues to infinity, for there is nothing first in an infinite series)—well
then if (i) everything moved is moved by something, and if (v) what first a20
incites movement is moved, but not by something else, it must be moved
by itself.²

2 The numbering system in the translation of this passage is only employed again in the *Extended Introductory Note* to discuss its interpretation and is not connected with that in the formal *Analysis*.

Extended Introductory Note

This is the first of four separate arguments for the claim (*B.I.1*) that wherever a series of sequentially moved movers does not lead back directly to an independent unmoved mover, it leads to a self-mover. In the translation the additions “(if it is the case that)” indicate that the whole of each of the conditional assertions *iii* and *iv* are grammatically coordinated with the conditions *i*, *ii.α'* and *ii.β'*, as all protatic together (i.e., all conditions introduced by the initial ‘if’ in 256a13), placing restrictions on the assertion of what is finally given in the apodosis at a21, “it must be moved by itself”, following the repetition of *i* and apparent addition of *ν*. What intervenes in a17–19, in parentheses following Ross, is somehow a justification for the protatic conditional assertion *iv*, that if the first mover is ‘like this’, there must be no other (οὐκ ἀνάγκη, a17, with adhaerent οὐκ), presumably meaning no other putatively prior mover. For the meaning of ‘like this’ (τοιοῦτο, a16) see immediately below.

Note also that while *i* to *ν* are all in some way premisses for the conclusion in the apodosis, they are not all co-ordinate in *logical* status. Firstly, since *ν* does not follow from anything else it remains hypothetical, and is best expressed by treating the conclusion as a conditional claim, that, if the first mover in a series is moved, it must be moved by itself (256a20–21). Secondly, the apodosis of *iv*, whatever ‘like this’ (τοιοῦτο, a16) in the protasis means, requires, as a first mover, the kind implied under possibility *ii.β'*, one not moved by something else, which could be either a self-moved or unmoved first mover. Next, note the protasis of *iv*, “if the first is like this”, *might* be meant to hypothesize the apodosis of *iii*, that the first mover is something not moved by something else (although see below), while the protasis of *iii* hypothesizes the possibility *ii.α'*, that a given thing in movement is moved by something that is itself moved by something else. Furthermore possibility *ii.β'* directly implies that in that case there is a first mover, in what moves something but is not itself moved by anything else, while *iii* asserts the same in the case of possibility *ii.α'*, its contradictory. Both possibilities are conjoined with, and so assume *i*, that there is a mover for any movement, but this was proven in Ch. 4. In that case since the argument effectively asserts unconditionally the subordinated apodosis of *iii*, that there must be a first mover not externally moved, on the view that the protasis of *iv* hypothesizes again this conclusion, the apodosis of the latter, that there must be no other cause prior to it, seems to follow immediately as a tautology. But this leaves quite unclear what the role of a17–19 (in parentheses in the translation) might be. Some scholars take a17–19 to support the claim there must be a first mover in a series, although on the account here that was already a result in the preceding passage, at 256a10–13, and moreover on the construal above it is not open to doubt within this passage.

It seems better to understand ‘like this’ in the protasis of *iv* to refer not to “which is not moved by another” (ὁ οὐχ ὑπ’ ἄλλου, a16) immediately preceding, but back to the conception of something that is moved, an idea generally present all along, and in particular to the idea of a moved mover present explicitly in “by something moved by something else” (ὑπὸ κινουμένου ὑπ’ ἄλλου, a14–15), and cf. “(moved) by something else” (ὑπ’ ἄλλου, a15). In this case the protasis of *iv* anticipates *v*, hypothesizing the case where the first mover is itself something moved. This gives much more point to the apodosis of *iv*, “there must be no different mover”, since so far the idea that a mover might be moved by itself has not been explicitly raised. The support given by a17–19 will then go to establish that even if the first mover is moved, there cannot be another (prior) mover.

Simplicius (1221.30–32) and Philoponus (832.3–6) offer a third possibility, taking ‘like this’ to refer to an originating mover that is first in the different sense of being immediately adjacent to the thing ultimately moved (cf. the use of ‘first’ at 256a5–6), so that Aristotle’s claim in the apodosis of *iv* would be that there is no need of any other mover prior to the immediate one. While this is unlikely, it comes to the same thing as the rejected first suggestion, and since an immediate originating mover is merely a special case of an originating mover, the same tautology results. Cf. also Blyth (2015, Ahead of Print pp. 5–8).

Analysis

The overall conclusion to each of Arguments *I–IV* stated here is (*B.I.1*) that if the first mover in a series is moved, it must be moved by itself (256a20–21), since (by Argument *I*) if the first mover is moved (or, less plausibly, unmoved by something else: see immediately above), there must be no different mover for it (256a16–17), because (*a*) if everything moved were moved by a different mover, any sequential series of moved movers would be infinite (supplied); but (*b*) it is impossible for there to be an infinite series of movers moved by something else (256a17–18), since (*b.i*) nothing is first in such an infinite series (256a18–19); and (*b.ii*) there must be a first mover unmoved by anything else, even though any subsequent movers in the series are each moved by something else (256a15–16), because (*b.ii.i*) everything moved is moved by something (256a13–14, cf. Ch. 4); while (*b.ii.ii*) what moves something may either be moved by something else or not (256a14–15); and (*b.ii.iii*) there must be a first mover (supplied; cf. 256a10–13 above).

Commentary

The conclusion here is that a first mover is either unmoved or else a self-mover, as Graham (1999, p. 93), notes (although claiming elsewhere that Aristotle

argues that it is always a self-mover). Apparently following Alexander (fr. 601 Rashed) in ignoring the qualification, Simplicius (1222.8–12) reports the overall argument here as that there must be a self-moved first mover; see similarly Waterlow (1982, p. 237). In his translation Kosman (1994b, p. 141) just omits the condition “if the first mover is moved”. Themistius (220.29–32) correctly asserts that the conclusion is not that there must be a first self-mover, but either that or an unmoved mover, although apparently contradicting himself (see 220.17–20). Aquinas (8.1040, cf. 1041), who rightly notes that Aristotle here assumes for argument’s sake the Platonic position, prior to showing it presupposes an unmoved mover, considers this proof more convincing than that of a first (moved) mover in *Ph.* 7.1, to which both Themistius (220.24–29) and Simplicius (1223.25–30) appeal at this point, and cf. Ibn Bājja (177.5–178.21, cited in Lettinck, pp. 604–605).

Graham (1999, pp. 91–93) reconstructs the argument of the passage in detail differently, but does not refer closely to the text: he derives the conclusion (256a20–21, his [12]) from his [6] (256a15–16, here *b.ii*, the claim that the first mover is not externally moved) by a series of steps (his [7]–[11]), none of which correspond to anything distinct in the text or the *Analysis* here and merely elaborate the relation between protasis and apodosis in the conclusion, while he derives his [6] from his [5] (equivalent to 256a17–18, here *b*, excluding an infinite series of moved movers), the reverse of the direction of implication in the *Analysis* above, and this in turn from his [4], the assertion that there is no infinite regress (corresponding to nothing else in the text) together with his [3] (supplied, here *a*), which in the *Analysis* above is instead co-ordinate with 256a17–18, here *b*, his [5]; Graham does not explain the role of either 256a16–17 (that, if it is moved, there is no different mover for the first mover), here the specific conclusion (*B.I.1.I*), or 256a18–19, here *b.i*, that nothing is first in an infinite series.

The two central claims are those at 256a15–16, here *b.ii* (that there must be a first mover unmoved by anything else), and a16–17, the conclusion *I*, as discussed above. Aquinas (8.1040) regards these (under the usual interpretation of ‘like this’, a16, rejected above), as self-evident, but all the same thinks both are justified by a17–19 where Aristotle appeals to the impossibility of an infinite series of externally moved movers. Yet the roles of these two key claims in the argument and their respective justifications need to be distinguished. The clause “if the first is like this” (a16) implies that the claim of a16–17 follows somehow from what precedes, usually taken to be just a15–16, the claim that there is a first mover that is not externally moved, and it is the position in the argument of that claim which must first be explained, as above.

In contrast to the *Analysis* here, Graham (1999, p. 90) thinks that 256a4–13 (see above, Section A, pp. 105–108) does not support 256a15–16, here *b.ii*, the claim that the first mover is not externally moved; accordingly Graham, like Simplicius (1221–1222) and Aquinas (loc. cit.), think a15–16 depends on the impossibility of an infinite series of movers (a17–18, here *b*). Yet as Graham notes, on this view Aristotle's immediately following claim “for (γάρ) there is nothing first in an infinite series” (a18–19, here *b.i*) cannot be the reason why there cannot be an infinite series, since on his interpretation the argument would be directly circular (presupposing, but going to support, the claim that there is a first mover). According to Graham, the impossibility of an infinite series follows from the impossibility of an actual infinite (see *Ph.* 3.5), yet this is not suggested here, and leaves a18–19 (here *b.i*, that nothing is first in an infinite series) unexplained. By contrast, Themistius (220.22–24), Simplicius (1221–1222) and Aquinas (8.1040) derive the impossibility of an infinite series of movers from the lack of a sufficient reason, in that case, for any mover in the series to be moved and so to cause movement (Simplicius 1222.1–2), appealing to 256a11–12 in the preceding section (above).

Ross (p. 698) explains 256a16–19 differently, by an implied argument that if there were a distinct mover required for the putative first, then similarly that would require its own distinct mover and so forth, generating an infinite series; but it is difficult to supply a whole argument, particularly one based on an incoherent premiss. Ross (loc. cit.) does not elaborate on the impossibility of the infinite series but his view implies that the conception of this infinite series is internally inconsistent, involving a first mover.

As opposed to these approaches the present *Analysis* treats 256a15–16, here *b.ii*, claiming that there is a first mover, not externally moved, as supporting a17–18, here *b*, the claim that an infinite series of movers would be impossible, since *b.ii* is the premiss required beside 256a18–19, here *b.i*, the claim that nothing is first in an infinite series, to produce 256a17–18 (i.e. *b*), by *modus tollens*.

Sorabji (1983, p. 227) notes that while Aristotle here excludes simultaneous infinite causal chains his belief in the everlastingness of species requires him to accept infinite causal chains of generation through time.

Note

At 256a16–17, here the conclusion to *I*, “there must be no” construes οὐκ ἀνάγκη restrictively in accordance with Greek usage with adhaerent οὐ (cf. οὐ δεῖ), but could be understood as “there need not be (any)”. The former is indicated in this case by the presence of ἀδύνατον in the supporting claim following (a17–18).

Ch. 5, 256a21–b3: (B.I.1.II) Argument from the Means Employed

256a21 *It is also possible to reach the same conclusion as follows. For everything that incites movement both moves something and by means of something. For either what incites movement does so by means of itself, or by means of something else, as a man does himself, or by means of his staff, and the*

a25 *wind knocks something down either itself or the stone it pushes does. But that by means of which something incites movement cannot do so without that which incites movement by means of itself. But if something incites movement by means of itself, there is no need of anything else by means of which it incites movement, whereas if that by which it incites movement is something different, there is something that will incite movement not by means of something, but by itself, or else they will form an infinite series. So if something moved incites movement, there must be a stopping point and it must not form an infinite series. For if a staff incites movement by being moved by a hand, the hand moves the staff. But if something else incites movement by means of this ⟨hand⟩,³ that which moves this ⟨hand⟩ is something different. Now when at each stage a different thing incites movement by means of something, there must be prior that which incites movement by means of itself. So if this is in movement, but what moves it is not anything else, it must move itself, so that, according to this account too, either what is moved is immediately moved by what moves itself, or it comes to this at some point.*

a30

256b1

Analysis

Here the claim (B.I.1) that wherever a series of sequentially moved movers does not lead back directly to an independent unmoved mover, it leads to a self-mover (256b1–3, cf. a19–21) is supported by the conclusion (II) that if the first mover is moved, it must move itself (256a33–b1), because (a) if a mover moves something by some means, and the means are moved, then that mover is what moves the means (supplied); and (b) every mover moves something, and moves it by means of something (256a22–23), since (b.i) a mover either moves by means of itself, or by means of something else (256a23), because (b.i.i) for instance, a man moves something himself, or by means of his staff (256a23–24); and (b.i.ii) for instance, the wind knocks something down itself or by means of a stone which it pushes (256a24–25); while (b.i.iii) what moves something directly itself does so by means of itself (supplied) – but (c) if

3 See the Note on 254a31–32 below (pp. 118–119) on the reading here.

something moves something by means of itself, there is no need of anything else by means of which it moves it (256a26–27); and (d) if that by means of which something moves something is different from itself, there will still be something which moves something not by means of something else, but by means of itself (256a27–28, a32–33),⁴ because (supported jointly) (c/d.i) that by means of which something moves something is unable to move it without that which moves something by means of itself (256a25–26), since (c/d.i.i) if there is no mover that moves something by means of itself, there will be an infinite series of moved movers (256a28); while (c/d.i.ii) a series of moved movers must be finite (256a28–29),⁵ because (c/d.i.iii) for instance, if a staff incites movement by being moved by a hand, the hand moves the staff, and if something else incites movement by means of this hand, what moves the hand too is something different, but eventually we reach a mover not different from the means by which it moves something (256a30–33).

Commentary

Cornford (1934, p. 318, intro. to Ch. 5) calls this argument merely a restatement of the previous one in another form, following Simplicius (1222.23–24), appealing to Aristotle's words "the same account" (256a21–22). They are right that the conclusion and some premisses, including the crucial appeal to the impossibility of an infinite series of moved movers (a28–29, here c/d.i.ii), are the same, but the conception of the *means by which* movement is incited is new, as Graham (1999, p. 93) notes, although elsewhere regarding it as identical to an intermediary mover (p. 89). Alexander (fr. 602 Rashed; cf. Simplicius 1222.24–28) states that the arguments differ in method, the preceding beginning from what is moved, and this from the mover, a view Simplicius rejects. Aquinas (8.1041) adopts this interpretation, but Simplicius (1222.29–1223.9) distinguishes the conceptions of what moves something *because of* either itself or something else, in the former argument (cf. 254a4–5), and, in the latter, *by means of* either itself or something else, on the ground that the former alternatives concern whether the mover has the first cause within itself or not, the latter whether it immediately adjoins what it moves or not. The *Analysis* above

4 I take ἀδύνατον ... ἀλλ'(ἀ) 256a25–28 as indicating that a conclusion is drawn from the impossibility (cf. Denniston, p. 1, i.i.b), consisting in the expansion of the logical possibilities left, at a26–28.

5 I take οὖν introducing 256a29 to be quasi-resumptive (see Denniston, p. 426 esp. on Eu. Or. 793, although Willink, ed., ad loc., prefers there Paley's δ' οὖν, which Denniston rejects, pp. 428–429), here after elision of a proof of the impossibility of an infinite series of moved movers.

of the previous argument does not support Simplicius' interpretation of it, but certainly that concerns what the mover is, for a given movement, whereas the present one focuses on the means by which a mover acts.

Graham (1999, p. 93) thinks Aristotle focuses on the need for a case where something (i) moves itself (ii) by means of itself, but nothing in the text corresponds precisely with that (although it would follow from the argument that what moves itself does so by means of itself). On the other hand, there is nothing in Aristotle's overall argument to exclude the possibility that an *unmoved* mover should move something by means of itself (cf. 256a22–23, here *b*), *contra* also Simplicius (1223.33–34). There is then no implication that a means is necessarily itself moved. Waterlow (1982, p. 237 n. 23) notes the ambiguity here in the use of the Greek instrumental dative, where 'by itself' (αὐτῷ) might mean 'by means of itself' (as its own means), or else neutrally 'without intermediary'; she observes a23, here *b.i*, suggests the former, because the alternative is 'by means of something else', while the examples immediately following (a23–25, here *b.i.i–b.i.ii*), opposing the instrumental dative to the nominative αὐτός ('he himself' <directly moves something>) suggest the latter. These examples should presumably determine interpretation of instrumental datives in the former statement, yet obscurity remains, since both examples (a man, the wind) are causes themselves in movement.

Notes

At 256a28–29, here *c/d.i.ii*, Simplicius (1223.24–30) suggests that the impossibility of an infinite series follows from the lack of a principle of movement, and he also appeals to *Ph.* 7.1, 242a49–b53 (cf. Alexander fr. 603 Rashed), but there is no reason for Aristotle here not to assert this as a lemma established in the last argument, as Aquinas (8.1041) says: if there is no infinite series of movers, there is none of instruments.

The example introduced in 256a30–33, here *c/d.i.ii.i*, of the hand as a means for someone (the man) who moves by himself, apparently presupposes, as does also the previous argument, that there must be a first mover (see 256a10–13 and *Commentary* above, esp. p. 107). Again, there cannot be an internally infinite series of means between a first mover and what is ultimately moved for Aristotle, because although the necessarily finite distance between them is infinitely divisible, each means, if physical, must be of finite magnitude so as to be actual.

At 254a31–32, in *c/d.i.ii.i* here, I translate the correction ταύτη of Ross (p. 698), following Pacius, for the MSS ταύτην, which Cornford (1934, p. 322 n. 1) translates

and explains, “if the hand itself is moved by something else (not by itself), i.e. if we have not yet reached a self-moving mover, then there must be another mover which is self-moved, beyond it and distinct from it”. The example seems to be of the principle that a means is moved by what uses it, so that, if the mover is moved, it is a means for some mover in each case different until we come to a first mover that uses itself as a means.

On the punctuation at 256b1, and the relation between the immediate conclusion of Argument *II* and restatement of *B.I.1*, see Blyth (2015, Ahead of Print p. 8).

**Note on Ch. 5, 256b3–13 & 256b27–257a27: (*B.I.1.III*)
Non-universality of Externally Moved Movers**

This is Argument *III* for the major Premiss *B.I.1*, that a first mover must be either unmoved or a self-mover. It is complex, perhaps directed against the atomist view that movement is maintained everlastingly by externally moved bodies transmitting movement to other such bodies, although Aristotle’s rejection of the possibility is more general and appeals to his own conceptions. Of the two distinct primary-level sub-arguments, *III.1* begins by distinguishing intrinsic and incidental movement (256b4–13 and 256b27–257a14), while *III.2* (257a14–25) appeals to the concept of potential, arguing that if everything moved were moved by something else in movement, all movers would have contradictory potentials (see further below, pp. 128–130). Argument *III.1* proceeds by excluding the alternatives that all movers are themselves either (1) incidentally (256b7–13), or otherwise (2) intrinsically, i.e., necessarily (256b27–257a14), externally moved, within which the exclusion of universally necessarily externally moved movers again appeals to Aristotle’s conception of potential, and proceeds by exclusion of the alternatives that a mover causes (2.1) the same (256b34–257a3), or (2.2) a different (257a3–14), kind of movement from its own.

Aquinas (8.1042) thinks *III* as a whole does not support the conclusion *B.I.1*, that the first mover, if moved, is self-moved, but establishes that not every mover is moved, preliminary to the main point that there must be an unmoved mover. Yet the introduction to the argument at 256b3–4 (“... this same result will turn out to be the case”) makes clear it is meant to parallel the two preceding arguments. For one reason for Aquinas’ mistake see below, the *Commentary* on 256b27–34 (pp. 123–124). He is no doubt also misled by the dislocation in the manuscript of 256b13–27, on which see the explanation where it is printed below, after 258b3 (pp. 155–156), and by the absence in

“by something in movement” (256b4, where he read *ab eo quod movetur*) of anything corresponding to ‘else’.

Ch. 5, 256b3–7: (B.I.1.III.I) Non-universality of External Moved Movers, Introduction

256b3 *In addition to what has been said, the same thing will turn out to be the case if we consider it as follows. For if everything in movement is moved*
 b5 *by something in movement, either this is true of things incidentally, so that what incites movement is in movement, but does not incite movement because it is itself in movement, or not, and it is true of things intrinsically.*

Analysis

Aristotle now defends the claim (B.I.1) that what is first moved will either be moved by something at rest or move itself (257a26–27) with the conclusion (III), that it is not possible for everything in movement to be moved by something else in movement (supplied; cf. 256b3–4), by Sub-argument III.I because (I.a) if everything in movement is moved by something else in movement, either this is incidentally or intrinsically so (256b4–7); and (I.b) if it is incidentally so, what incites movement is in movement, but does not incite movement because it is itself in movement (256b6–7); but (I.c) it is not possible that everything in movement is moved either incidentally, or necessarily, by something else in movement (supplied: see Sections III.I.1–2 immediately following).

Commentary

The argument here is very clear, but there are problems in understanding Aristotle’s conception of what is incidental: see the *Commentary* on the following passage, referring back to 256b6–7, here (I.b).

Ch. 5, 256b7–13: (III.I.1) Exclusion of Incidental Universality of Moved Movers

256b7 *So firstly, if it is incidentally true, there is no need that what incites movement be in movement. And if this is so, it is clear that at some point of time no beings at all may be in movement. For what is incidental is not necessary, but may not be. Now if we assume what is possible, nothing*

b10

impossible will follow, although perhaps a falsehood. Yet it is impossible that movement not be, for it has already been proven that there must always be movement.

Analysis

Here Aristotle argues that it is not possible that everything in movement is moved by something else incidentally in movement (supplied; cf. 256b4–7 above and b7–8), because (a) if it is incidentally so, at some point in time nothing might be in movement (256b8–9), since (a.i) in that case there is no need that what incites movement be in movement (256b7–8), because (a.i.i) what is incidental is not necessary, and may not be the case (256b9–10) – but (a.ii) *ex hypothesi* everything in movement is moved by something else in movement (256b4–5 above) – while (b) if we assume as true what is possible, nothing impossible should follow, although perhaps a falsehood (256b10–12, cf. *APr.* 1.13, 32a18); and (c) it is impossible that there might be no movement (256b12), since (c.i) it has already been proven that there must always be movement (256b12–13; see *Ph.* 8.1–2).

Commentary

Graham (1999, pp. 93–94) compares this argument in form with that at *Metaph.* 12.6 for a first mover that must be essentially active in order to ensure everlasting movement. Seeck (pp. 158–159), Solmsen (1967 p. 15) and Zekl (p. 286 n. 66) complain that the course of the reasoning at 256b8–9, here *a*, is unclear. As presented above, this claim follows obviously from b7–8, here *a.i*, indicated by Aristotle's "and if this is so" (ἐἰ δὲ τοῦτο, b8), along with *a.ii* as explained by Alexander (fr. 608.7–9 Rashed = Simplicius 1225.36–38, unnoted by Rashed) and similarly Aquinas (8.1043) and Ross (p. 698), while that b9–10, here *a.i.i*, somehow also supports *a* is indicated by 'For' (γάρ, b9), and in fact b7–8 does follow from b9–10; then b10–12, here *b*, refers to assuming as true the putative possibility that follows if all movers are only incidentally moved, that no mover might be moved, and b12–13, here *c*, points out that the consequence is in fact impossible, which implies that the assumption is also impossible.

Overlooking how Alexander's appeal to b4–5, here *a.ii*, makes sense of the argument, Seeck labels 256b8–9 and b12–13 as later insertions posing an objection, and takes b7–8 as the key: in effect, the reason for rejecting the possibility that all movers are incidentally moved would be that if they are moved, they must not be at rest, but what is incidentally moved may be at rest, thus they are not incidentally moved. But despite the superficial similarities this is costly, sophistic, and a weak solution compared with Alexander's.

Alexander's interpretation solves a further problem debated by later scholars. Two interpretations are possible of what is incidental (κατὰ συμβεβηκός, *kata sumbebēkos*, 256b7–8) in the argument: either (1) a mover's causal activity, and *a fortiori* its own movement, as a precondition for that, are incidental to what it essentially is and does, or else (2) the mover's movement is incidental to its causal activity. On Interpretation 1, b7–8, here *a.i.* means that what incites movement does so because it is incidentally in movement, and b8–9, here *a*, follows from *a.i.* alone. Yet in this case, if Aristotle does not contradict there what he means at 256b6–7 (in the previous passage above), οὐ μέντοι διὰ τὸ κινεῖσθαι αὐτό could only mean “but not because it *must* itself be in movement”, although this is not the natural meaning, which is rather that the mover's own movement is incidental to its causal activity, i.e. Interpretation 2. At b6–7 three manuscripts (in a less reliable grouping) add ἀεί (‘always’), which would solve the problem by implying that the agent only causes movement whenever it happens to be moved itself, i.e. 1.

Alexander (fr. 608 Rashed), Simplicius (1225.14–16, 24–28 with Chase and Share, trans. of Simplicius, p. 138, ns. 522–523, and 1228.13–15) and Aquinas (8.1043) assume Interpretation 2, as does Ross (p. 698), followed by Seeck (pp. 158–159), Solmsen (1967, p. 15) and Sorabji (1983, pp. 227–228). Modern scholars compare 256b27–29 below:

But in fact, if what incites movement is not moved incidentally but necessarily, and if it were not moved it could not incite movement, ...

This seems to imply that what distinguishes the case where the mover is necessarily moved, is that its movement is necessary for its causal activity; accordingly Aristotle would here imply that what is incidental in the present case is the mover's own movement, not its causal activity.

This passage alone is not dispositive, since it is at least possible that the second condition at 256b28–29 (“and if it were not moved it could not incite movement”) does not explain the first (“if what incites movement is not moved incidentally but necessarily”), as distinctive of necessary causation, but states an additional condition common to all moving causation, on the argument's hypothesis (cf. *a.ii* in the *Analysis* above). But in any case 256b6–7 creates a strong presupposition in favour of Interpretation 2, whereby any and all active movers might be incidentally motionless (*a.i.*, b7–8); then by *a.ii*, hypothesizing independently that in fact when they act they are in movement (b4–5), *a* follows, that there might be no movement (b8–9). Thus, contrary to Wagner (pp. 677–678), there is no need for κινούμενον rather than κινούν at b8.

Ch. 5, 256b27–34: (III.I.2) Exclusion of Necessary Universality of Moved Movers, Introduction

[On the dislocation in the manuscripts of the passage 256b13–27, presented at the end of the chapter, see the *Note on location here of Ch. 5, 256b13–27* (pp. 155–156), following *Ch. 5, 258b4–9: general conclusion to Argument (B.I) for an unmoved mover*. As Wagner (p. 677) observes, what now follows is anticipated by ‘firstly’ (256b7, in III.I.1).]

But in fact, if what incites movement is not moved incidentally but necessarily, and (again) if it were not moved it could not incite movement, (then) the way what incites movement is moved, insofar as it is moved, must either be with the same form of movement, or with another. I mean that either what heats is itself being heated, and what heals is being healed, and what transports transported, or what heals is being transported, and what transports is increased. 256b27 b30

Analysis

In preparation to exclude the claim that all movers are necessarily externally moved (257a25–26; cf. here 256b27–29), Aristotle (*a*) distinguishes within this possibility, a moved mover causing movement, first, of its own kind (256a29–31; cf. III.I.2.1 following), and, second, of a different kind from its own (256a31; cf. III.I.2.2), justified (*a.i*) first, with examples of inciting the same kind of movement the mover undergoes, for instance what heats being heated, what heals being healed, and what carries being carried (256b31–33), and, second, with examples of inciting a different kind, for instance, what heals being carried, and what carries being increased (256b33–34).

Commentary

This distinction enables Aristotle in the arguments following to exclude individually, as possible instantiations of the hypothesis that all movers are necessarily externally moved, both alternatives, that every external mover incites either the same (256b34–257a3) or a different kind of movement (257a3–14) from its own. As stated at 257a25–26, the overall conclusion of the arguments below allows that, unlike an external mover, a *self*-mover might be possible, as Aristotle’s following statement acknowledges: “As a result, what is first moved will either be moved by something at rest, or move itself” (257a26–27). But the arguments for III.I.2 and III.II (256b34–257a27) themselves seem to imply directly more than this: rather, that every movement is ultimately due to an unmoved external mover, on the grounds that no self-mover could undergo the

same movement it causes, while if it underwent a different movement, it would not be a first mover; cf. Ch. 6, 259b7–20, and Alexander (ap. Simplicius 1232.10–14), with Simplicius' reply (1232.14–17) denying this.

Waterlow (1982, p. 253), furthermore, notes that the arguments apply to every instance of moving causation. Thus, for instance, 257a3–14 (*III.I.2.2* below) implies it would be equally absurd that *any* body is healed, if it is ultimately indirectly caused by another body that is being healed, and so undergoing the same movement it is causing, as that a teacher should be directly learning what he is teaching (cf. 257a1–3). This might seem to be more than is required for the conclusion at 257a25–27 (cf. a14–16), which is merely that *not all* movers in a causal chain leading to a given movement are themselves necessarily externally moved. We could then understand 256b34 as asserting, “it is not possible (sc. that *every* mover must be moved with a movement of the same kind as or of a different kind from what it incites)”, and suppose the impossibilities demonstrated only occur in particular kinds of case, since it is not clear how far they are meant to be generalisable; but the problem arises that then Aristotle should have shown that the *same* movers are (i) not moved with the same movement as they cause and (ii) not moved with a movement different from what they cause, which he does not do. So it is easier to take him to be arguing for the stronger case, as assumed by Waterlow. Perhaps then Aristotle assumes causal chains are all so short that none can repeat the same form of movement, but it would be hard to establish that for elemental interactions, for instance. This is evidence that the arguments of *B.I.1.III–IV* are dialectical, and more or less *ad hominem*, by contrast with physical arguments *B.I.1.I–II*, which rely more closely on Aristotle's own principles; for the distinction see *Ph.* 8.8, 264a7–9.

Note

At 256b31–33, here *a.i.*, Aristotle's examples of movements, change of quality (heating and healing), change of place (*phora*, literally carrying, i.e. transportation) and change of quantity (increase) cover all three of the categories in which he recognises movement, i.e. change, (*kinēsis*), strictly conceived (cf. *Ph.* 5.2).

Ch. 5, 256b34–257a3: (*III.I.2.1*) Exclusion of the Same Kind of Movement

256b34
257a1

But it is obvious that this is impossible. For one should discuss this by distinguishing individual cases, such as that if something is teaching

geometry, this same thing is being taught geometry, or if something is throwing things, it is being thrown with the same kind of throw.

Analysis

Here Aristotle argues that if all movers are necessarily externally moved they cannot cause the same movement they undergo themselves (256b34), because (a), for instance, what was teaching geometry would be learning the very same thing, and what was throwing something would be itself being thrown in the very same way (257a1–3), since (a.i) this would in that case be true of the most specific kinds of movement (256b34–257a1); and (a.ii) teaching geometry and throwing are specific kinds of movement (supplied) – but (b) these cases are clearly impossible (supplied: cf. 257a12 below).

Commentary

Aristotle's examples are chosen to seem absurd. Throwing is not paradigmatic of moving causation for him, but a special case, requiring an unusual (apparently *ad hoc*) explanation at Ch. 10, 266b27–267a20, precisely because contact with the thrower, *qua* initial mover, is lost, in the nature of the case, contrary to Aristotle's normal doctrine. Thus it would be absurd in this case if the thrower were necessarily being thrown. Teaching nevertheless exhibits a feature of the normal doctrine locomotion generally lacks, that the cause already actually possesses that characteristic for which it activates a potential in what it moves, as for example what is hot heats by activating the potential in a subject to be hot. In such cases, primarily alteration, it would be absurd if what was effectively transmitting a form did not already possess it. This indicates how difficult locomotion as a whole is to fit into Aristotle's paradigm; cf. Waterlow (1982, p. 253). This argument is dialectical both in not focusing on Aristotle's own causal principles, but appealing to common appearances, and in appealing to an opponent's beliefs without particular regard for consistency of the premisses.

Ch. 5, 257a3–14: (III.I.2.2) Exclusion of a Different Kind of Movement

Alternatively it is not like this, but each is moved with a different kind of movement, such as what transports being increased, and what increases this being altered by something else, and what alters this being moved with some different movement. But this must come to an end, for the kinds of movement are limited. And to come round in a circle and to

257a3
a5

a10

say that what alters is transported is to do the same thing as one would if he immediately said that what transports is transported and what teaches is taught (for it is clear that everything in movement is moved also by the higher mover, and more so by the mover that is prior). But in fact this is impossible, for that which teaches turns out to be learning, and of these two one must not have, and the other have, the knowledge.

Introductory Note

Sub-argument *III.I.2.2*, excluding external movers in every case moved with a different kind of movement, is slightly more complex than Sub-argument *III.I.2.1* excluding movers with the same kind of movement (256b34–257a3), but in effect reduces to it. From these two results it follows (*III.I.2*) that what is in movement cannot be moved in every case by something else itself necessarily in movement (supplied), and then together with (*III.I.1*) the exclusion of an external mover in every case incidentally in movement (256b7–13), it follows generally (*III.I*) that it is not possible that everything in movement is moved by something else itself in movement (257a25–26, cf. 256b3–4, 257a14–15), meaning there must be a first unmoved or self-moved mover.

Analysis

This argument concludes that it is not possible that every external mover is necessarily moved with a different kind of movement from what it incites (257a6–7), because (a) if a different kind of movement were possible, for example, what carries would be increased, and what increases this would be altered by something else, and what alters this would be moved with some different movement (257a3–6); but (b) then some mover would be moved with the same kind of movement that it itself incites (257a8–10), since (b.i) the ascending series of movers will return to one moved with the same kind of movement that is ultimately to be explained (257a7–8), because (b.i.i) the kinds of movement are limited (257a7); and (b.i.ii), for instance, in the example above, it would imply that what alters is itself carried, and yet (indirectly) causes something to be carried (257a8), since (b.i.ii.i) being carried (i.e., locomotion), being increased and being altered are the only three genera of movement (supplied: see *Ph.* 5.2); and (b.i.ii.ii) otherwise through even fewer intermediaries the moving cause is subject to a form of movement it causes (supplied) – while (b.ii) everything moved is more properly moved by a mover higher in the series of movers (257a10–12, cf. 256a10 above) – but (c) it is impossible that some mover would be moved with the same kind of movement that it itself incites (257a12), because (c.i) in that case, the teacher would be a student at the same time (257a12–13); but (c.ii)

that is impossible (supplied), because (*c.ii.i*) the teacher has the knowledge, and the student lacks it (257a13–14).

Commentary

The argument turns on the claim that eventually some mover in a series would be moved with the same movement it incites (257a8–10, here *b*). Simplicius (1230.19–30) rightly explains the resulting impossibility (257a12–14, here support for *c*), as that contrary to the outcome here, a cause such as the teacher or hot thing, must already have learnt or become hot before teaching or heating another. Ross (pp. 699–700), followed by Graham (1999, pp. 95–96), criticises the argument because a movement of the same kind is not the same movement, and therefore no absurdity of the sort claimed at 257a12–14 results. But Simplicius (1229.17–25), referring to 257a7, here *b.i.i*, stating the kinds of movement are limited, argues that the species within each of the three genera of movement are also limited, so the result would eventually follow over a longer chain of causation, and with appropriate alterations to the support supplied for *b.i.ii*.

Graham (*loc. cit.*) argues also that if (e.g.) *A* pushes *B*, and *B* hits *C*, and *C* trips *D*, and *D* pushes *E*, we would not say that *A* pushes *E* (but perhaps that *A* moves *E*); yet this appeal to linguistic intuition does not address whether perhaps we ought to: after all, *A* pushes, and this leads to *E* being pushed. Again, if I switch on an electric connection, and that powers a capacitor, and that produces a varying field in a coil, and that spins an armature, I switch on a motor, and if the motor mechanically switches on another electric circuit containing a light bulb, I even switch on that light (as we say).

Seeck (pp. 160–162) argues that this passage is a later insertion, since in the immediately preceding argument εἶδος (*eidos*, ‘form’, 256b30) is first not used in a sense distinct from γένος (*genos*, ‘kind’), as the following mixed examples of both genera and species show (b31–33, cf. 257a22–25 below); but then a genus-species distinction is implicitly made (256b34–257a1), with examples of species (a1–3); whereas the present argument, following the reference to *genos* (a4), again mixes examples of genus and species (a8–10), contrary to the distinction. But the distinction does not require the use of fixed terminology, and need not be continually observed when no longer required in a subsequent (i.e. the present) argument. Moreover Seeck’s proposal also requires the backward reference to this argument at 257a22–23 be removed, leaving the point there very unclear; see also criticism by Solmsen (1967, p. 14).

Ch. 5, 257a14–27: (III.II) Argument from Unaccountably Linked Potentials

257a15 *But still more than this, it is unaccountable that it turns out that every-*
thing capable of inciting movement is moveable, if in fact everything
in movement is moved by something in movement. For it will be move-
able just as if someone were to say that everything capable of healing is
healable, and what is capable of building is buildable, either directly, or
through several intermediaries. I mean as if everything capable of incit-
a20 *ing movement is moveable, but not moveable with the same movement to*
which it incites its neighbour, but with a different one, such as if what is
capable of healing is capable of learning; but then by ascending (through
its causes) this will come at some point to the same form of movement,
as we said before. The one case is impossible, the other a fantasy, for it is
a strange (proposal) that what is capable of altering something is neces-
a25 *sarily capable of increase! Thus it is necessary that what is moved is not in*
every case moved by something else itself in movement. Thus it will come
to an end. As a result, what is first moved will either be moved by some-
thing at rest, or move itself.

Introductory Note

At the end here Aristotle derives the overall conclusion (B.I.1) that there must be a first mover, either unmoved or self-moved (257a26–27), because any chain of movers must be finite (257a26), since it is necessary that what is moved is not in every case moved by something else itself in movement (257a25–26), supported now by another shorter Sub-argument III.II, focusing on the attribute of being potentially moved, i.e. moveable (κίνητον, *kinēton*, a15), following the previous extended complex Sub-argument III.I, by exclusion of both incidental and necessary movement of the mover (256b4–13, 256b27–257a14). For οὐκ adhaerent (257a25) compare 256a16–17 with *Note* (p. 115), and 257a14–15, here *b*, *contra* Wagner (pp. 679–670 and trans. p. 236).

Analysis

Aristotle concludes that what is moved is necessarily not in every case moved by something else itself in movement (257a25–26), because (a) if everything moved were moved by something else in movement, everything that could incite movement would be moveable by something else (257a15–16, cf. a19–20); but (b) it is unaccountable (ἄλογον) that everything that could incite movement would be moveable (257a14–15), because (b.i) in that case, everything that could heal would be healable, and everything that could build would be buildable,

either directly or through several intermediary steps (257a16–19), since (*b.i.i*) if not directly, in any case, eventually the ascending series of potential movers would return to one capable of the same form of movement, just as argued previously (257a20–23, cf. 257a7–8 above) – but (*b.ii*) it is impossible that what could incite movement is moveable with the same movement, and a fantasy that it might have to be able to undergo any different kind of movement (257a23–24), since (*b.ii.i*) it would be strange if what could alter something had to be capable of increase (257a24–25).

Commentary

Ross (p. 700) and Zekl (pp. 286–287 n. 74) apparently treat this not as a separate argument but a restatement of the preceding one (257a3–14), yet it covers the cases both of being able to cause a different movement from that with which a mover is moveable, and the same one (see ‘either directly’, 257a18, here in *b.i*, and ‘the one case’, a23, in *b.ii*), and introduces a comparison of potentials not previously employed (similarly Wagner, p. 678). Cornford (1934, p. 318, intro. to Ch. 5) recognises it as distinct, without elaboration. Simplicius (1230.37–1231.1) and Aquinas (8.1048) claim it differs because the previous arguments only lead to particular self-contradictions (the thrower thrown and the teacher taught), but this leads to general self-contradiction.

Notes

At 257a14–15, here *b*, Aquinas (loc. cit.) takes Aristotle to mean the hypothesis of everything capable of causing movement being moveable is “even more unaccountable” than the previously mentioned example of the teacher being taught, but I take *μᾶλλον τοῦτων* adverbially. Aquinas’ explanation is that the teacher was originally taught, but the builder, mentioned at 257a18, here *b.i*, was never built, but this is not obviously generally the case, since the previous argument also involved the thrower being thrown, which seems equally absurd, and the present one the healer being healed, which is not so strange. Simplicius (1231.2–4) more plausibly finds it more irrational that the power that causes movement will be responsible for movability; thus the distinction of active and passive will be confuted.

At 257a23–24, here *b.ii*, asserting both an impossibility (that what could incite movement is moveable with the same movement), and a fantasy (that it might have to be able to undergo any different kind of movement), Alexander (fr. 620 Rashed, ap. Simplicius 1231.20–27 and cf. Philoponus 883.27–31) claims that Aristotle means the former is merely impossible, the latter *also* fantastic, since a different form of movement anyway leads back to the same impossibility. Sim-

plicius (1231.27–34) says what is fantastic is imagining there could be an infinite series of different forms of movement, and that the prior mover is not more responsible for the movement of what is moved than its intermediaries. Apostle (p. 322 n. 24) thinks the fantasy would be that, e.g., a teacher while teaching a student would have to be taught by another teacher, indirectly through a series of intermediate movers. But Aristotle himself apparently indicates what he means by fantasy in the following sentence (257a24–25), that being able to alter something else might require being able to grow larger (*b.iii.i*: note ‘for’, γάρ). Yet he here apparently overlooks the possibility that something causing one movement might necessarily have some movement of its own, but not necessarily any *particular* kind. Admittedly his theory of a hierarchy of types of movement makes this seem implausible to him (cf. *Ph.* 8.7); more generally in a determinate cosmos it would seem even more peculiar if something with the power (for instance) to alter something had to be undergoing some *undetermined* form of movement.

Like the preceding arguments against incidentally or necessarily universally moved movers this argument is essentially dialectical. Common features include methodical exclusion of possibilities (*reductio ad absurdum*), and premisses not belonging strictly as stated to Aristotle’s positive doctrine, but which an opponent might accept, although some concepts, such as potential here, and the distinction between what is incidental and intrinsic or necessary, receive precise meanings in his doctrine.

Ch. 5, 257a27–31: (*B.I.1.IV*) Argument from a Platonic Assumption

257a27

But in fact even if it were necessary to investigate whether what moves itself or what is moved by something else is responsible for movement as its principle, anyone would pick the former. For what is so in respect of itself always has a prior responsibility for what is so in respect of something different.

a30

Introductory Note

After two arguments (*I–II* above), of the kind Aristotle elsewhere calls ‘physical’, since they assume his own physical principles and other doctrines, and one dialectical argument (*III*) that seems addressed particularly against atomist and other pluralist assumptions, the final Argument *IV* for the general conclusion *B.I.1* repeated immediately previously (257a26–27, in the previous passage), is also dialectical.

Analysis

The conclusion stated here is that if it were necessary to investigate whether the principle responsible for movement is what moves itself or what is moved by something else, everyone would pick what moves itself (257a27–30, cf. Pl. *Phaedrus* 245c5–7), since (a) what is so intrinsically (καθ' αὐτό, *kath' hautō*, “in respect of itself”) always has a prior responsibility for what is so extrinsically (καθ' ἕτερον, *kath' heteron*, “in respect of something else”) (257a30–31); and (b) what moves itself is moved intrinsically, whereas what is moved by something else is moved extrinsically (supplied).

Commentary

Here Aristotle adopts the assumption of Plato's cosmological argument for the immortality of the soul at *Phaedrus* 245c–246a, that we must decide between two contenders as principles of movement, what is moved by itself or what is moved by something else (*Phaedrus* 245c5–7), and agrees that if that *were* the key consideration, then what moves itself *would* be the cause (257a27–30). Note the hypothetical use of a future remote condition, where Plato uses indicatives. Aristotle formulates the reason for the hypothetical Platonic choice in his own terms, that what is so intrinsically (i.e., in respect of itself) always has a prior responsibility for what is so extrinsically (i.e. in respect of something else, 257a30–31). This lines the Platonists up with Aristotle in opposition to pluralists who claim that all moving causes are moved by something else, but it does not identify Aristotle's own view with this Platonist theory. It is merely dialectical support for Aristotle's own claim here, since if the first mover was what moved itself, then again it would follow merely formally that the first mover is either unmoved or moved by itself, and Aristotle distances himself from any commitment to Plato's reasoning. Nevertheless in what follows he will demonstrate (*B.I.2*) that even a self-mover contains an intrinsically unmoved mover.

Alexander (fr. 622 Rashed) apparently recognises 257a27–31 as a distinct argument, but Cornford (1934, pp. 318–319, intro. to Ch. 5) does not, interpreting a25–31 as a whole to conclude that a series of externally moved movers terminates either in an unmoved or a self-moved mover; nor apparently does Graham (1999, p. 96), who treats a27 instead as beginning the account of how self-movement is possible, as does Zekl (p. xli and p. 287 n. 75). Meyer (p. 66), citing 257a27–30, ignores the restricting qualification, “If it were necessary to investigate whether the principle responsible for movement is what moves itself or what is moved by something else” (mistakenly implying that the argument here leaves out of account, by adopting the Platonist premiss, the possibility that the primary cause is completely unmoved, and thus not part of a self-mover); cf. similarly Shields (p. 127).

Note on Ch. 5, 257a31–258b4: (*B.I.2*) Reducing Self-movers to Mover & Moved Parts

This is the second half of Argument *B.I*, as a whole establishing that the first mover of any movement is intrinsically unmoved (258b4–5, b8–9). On the overall structure of Argument *B.I* see further the *Note on Ch. 5, 256a13–b24 & 256b27–258b9: (B) unmoved first movers* (pp. 108–111). This argument takes up most of the long Part *B* that itself constitutes most of the chapter; see further the *Introduction* to the chapter (p. 105). Aristotle has now completed the support (256a13–b13, 256b27–257a31) for the top-level Premiss *B.I.1* that if a chain of moved movers does not lead back directly to an unmoved mover, it must lead to a self-mover, and now (257a31–258b4) he argues for *B.I.2*, that a self-mover in any case divides into an intrinsically unmoved mover and an intrinsically moved part.

This extended passage is here divided into eight co-ordinate claims (see the *Note* referred to immediately above); these can be summarised in four informal parts as follows: (i) *B.I.2.1–3*, establishing the distinction between the mover and moved parts of a self-moving whole (257a31–b13); (ii) *B.I.2.4*, that the mover is unmoved, by exclusion of the alternative possibilities that the parts move each other reciprocally, or that either part itself is originally self-moving (257b13–258a5); (iii) *B.I.2.5*, on the uniqueness of the moved part (258a5–20); and (iv) *B.I.2.6–8*, covering contact between the parts, their joint action and the integrity of the self-moving whole (258a20–b4).

Ross (p. 700), followed closely by Graham (1999, p. 96), and cf. similarly Cornford (1934, p. 319, intro. to Ch. 5) and Cherniss (p. 390 n. 310), regards the whole of 257a33–258b9 as a single articulated unit concerning how a self-mover can move itself. Thus Ross claims Aristotle first rejects the possibility that it essentially moves itself as a whole (257b2–12), and then considers three ways distinct parts might be involved, rejecting reciprocally acting parts (257b13–26) and self-moving parts (257b26–258a3), and supporting the distinction of a mover and moved part (258a3–b9). These correspond respectively here with *B.I.2.3*, part of *B.I.2.4*, another part of *B.I.2.4*, and *B.I.2.5–8*.

Rashed (pp. 547–549), collects and discusses three ancient versions of Eudemus' analysis of possible modes of self-movement, applied to Aristotle's procedure here (Alexander fr. 624 Rashed, Simplicius 1233.36–1234.8 and Themistius 221.8–16): (i) the whole acting on the whole (cf. 257b2–13, here *B.I.2.3*); (ii) a part on the whole (257b26–258a1, in *B.I.2.4* against a self-moving part); (iii) the whole on a part (not discussed by Aristotle); or (iv) one part on another, and in the latter case either (iv.α') reciprocally (257b13–26, in *B.I.2.4*) or (iv.β') distinct parts respectively inciting and undergoing movement intrinsically (257b2–13,

here *B.I.2.3*, and 258a1–b4, end of *B.I.2.4* to *B.I.2.8*). Themistius (221.16–23) then claims Aristotle shows in the rest of the chapter that each, except his own theory, implies the impossible result that mover and moved aspects are not distinct; Alexander (fr. 624.7–8 Rashed) is similarly misleading. By contrast Simplicius (1234.6–7), and Ibn Rushd (*LC* 381I4–382G7, cited by Lettinck, p. 645) who names both Themistius and Alexander, reject this as an account of Aristotle's treatment (which was probably not Eudemus' intention). What survives of Philoponus (834.9–15) lists just the possibilities Aristotle discusses; cf. also Abū l-Faraj (862.12–863.15, cited by Lettinck, pp. 572–573).

Aquinas (8.1050) first divides 257a33–258a5, here *B.I.2.1–4*, from the rest, as all concerned with division of a self-mover into moved and moving parts, and he treats what follows (i.e. *B.I.2.5–8*), as about the relations among the parts; Aquinas then divides the former into 257a33–b13, here *B.I.2.1–3*, demonstrating the need for distinct parts, and 257b13–258a5, here *B.I.2.4*, rejecting other ways it might move itself; this as a whole generally corresponds with the modern view.

Ch. 5, 257a31–b1: (*B.I.2.1*) Initial Question & (2) A Self-mover's Physical Divisibility

*As a result, we should take another starting point, and investigate this: if 257a31
something moves itself, how does it incite movement, and in what man-
ner? Well everything moved must be divisible into infinitely divisible parts.
For this has been demonstrated previously in the general account of 257b1
nature, that everything intrinsically moved is continuous.*

Analysis and Commentary

(1) The introductory question to be answered during 257a31–258b4 is stated at 257a31–33, “if something moves itself, how does it incite movement, and in what manner?” Zekl (p. 287 n. 75) notes that while Aristotle announces another starting point here (*ἄλλην ἀρχήν*, a32), this does not mean that what follows is entirely independent, since it responds to the result that some causal chains begin from a self-mover. By contrast Alexander (or a scholiast?: fr. 623 Rashed), supposing what precedes showed that what moves itself is first among (or, Rashed, corr., p. 546: first cause of) what is moved, and that this was under the assumption that everything is in movement, implies that the new beginning drops the latter assumption. No such assumption was stated generally, but certainly ‘as a result’ (*ὥστε*, 257a31) naturally refers to the hypothetical conclusion of the previous dialectical Argument *B.I.1.IV*, that on the

Platonic assumption that the choice of a first cause is only between what is moved by itself or by something else, anyone would say it is what is moved by itself; yet that is subordinate to the general result of *B.I.1*, that a first mover is either unmoved or self-moved (257a26–27). This leaves it an open question whether self-movers are irreducibly first movers, and in any case how they are related to unmoved movers. Aristotle proposes investigating this in terms of how a self-mover moves itself, and will show it must contain a distinct intrinsically unmoved mover and a moved part, the one acting directly upon the other.

(2) Next in 257a33–b1 Aristotle establishes that a self-mover must be divisible into infinitely divisible parts (supplied), since (a) everything in movement must be divisible into infinitely divisible parts (257a33–34), because (a.i) everything in movement must be continuous (257b1; cf. *Ph.* 6.4, 234b10–20).

Graham (1999, p. 97) comments that the infinite divisibility of the moveable seems irrelevant here. I suggest the main point is that a self-mover could not be a soul (as Plato argues), since the moved part must be a body. Alternatively or additionally, perhaps an argument is implied here that if the self-mover is divisible in one way it is likely to be so in others. Aquinas (8.1051) suggests it signifies that a self-mover cannot form a seamless whole, yet physical divisibility would only be directly relevant if the mover was a physical part, subsequently doubted (258a20–21; cf. Ch. 4, 254b28–33 and Ch. 10). Otherwise the only apparent relevance is to the concluding arguments about contact between mover and moved at 258a20–22 (*B.I.2.6*), and the objection that what is moveable might be divided at a27–b4 (*B.I.2.8*).

Note

At 257a34–b1 where Aristotle states, “this has been demonstrated previously in the general account of nature”, Ross (p. 700) suggests the reference to Bk 6 above under 2, but Simplicius (1233.25) proposes Bk 5, least implausibly meaning 228a20–22, although this concerns a movement, not a moved thing. Aristotle’s ‘this’ (τοῦτο, a34) might refer (i) backwards, to the infinite divisibility of what is moved (a33–34), so that the claim that what is intrinsically moveable is continuous is a reason (257b1, ὅτι causal), or (ii) forwards to the latter, again as the reason (note γάρ, a34); either way the argument is the same.

Ch. 5, 257b2–13: (B.I.2.3) Differentiation of Mover and Moved Parts

Now it is impossible for that which moves itself to move itself throughout;⁶ for it would be transported and transport, as a whole, on the same journey, while being one and indivisible in form, and it would be altered and alter, so that it would teach and learn jointly, and heal and be healed with the same health. Furthermore it has been established that what is in movement is the moveable, and this is in movement by being potentially, not actually, so, and what is potentially so advances towards actuality, and movement is the incomplete actuality of the moveable. And that which incites movement is already actually so, as what is hot heats, and overall what has the form generates. As a result the same thing jointly and in the same respect will be both hot and not hot. And similarly also each of the rest of things of which the mover must have the same name (will be both so and not so). Thus one part of what moves itself moves, and another part is moved.

Analysis

Here Aristotle argues that the mover and moved parts of a self-mover are distinct (257b12–13), with two separate arguments, (I) from contradictory processes (257b2–6); and (II) from contradictory attributes (b6–12). Argument I concludes that what moves itself cannot move itself at every point (257b2), because (I.a) if it did, for instance it would both teach and learn (the same knowledge) together, or heal and be healed with the same health (257b4–6), since (I.a.i) it would carry and be carried, as one identical thing on the same journey, and alter and be altered, and generally move and be moved thus (257b3–4) – but (I.b) this is impossible (supplied: see 257a12).

Argument II, from contradictory attributes, is that, unless mover and moved parts in a self-mover are distinct, the same thing will be, for example, at the same time and in the same respect, both hot and not hot (257b10–11), because (II.a) wherever the mover has itself the name of the attribute it generates in what it moves, the same thing will both have and not have that attribute at the same time and in the same respect, unless mover and moved parts of a self-mover are distinct (257b11–12), since (II.a.i) what is being moved is not yet actually what it is becoming (supplied), because (II.a.i.i) what is moved is the moveable (257b6, cf. *Ph.* 3.1, 200b31–33); and (II.a.i.ii) the moveable in

6 $\pi\acute{\alpha}\nu\tau\eta$ (257b2) almost certainly means ‘at every point’, not ‘in every respect’, *contra* Apostle (p. 322 n. 27).

movement is potentiality, not actuality so (257b6–7); while (*II.a.i.iii*) admittedly what is potentially so advances to actuality during movement (257b7–8); nevertheless (*II.a.i.iv*) movement is the incomplete actuality of the moveable (257b8–9, cf. *Ph.* 8.1, 251a9–10; *Ph.* 3.2, 202a7–8, with 201a31–33; also 3.1, 201a10–11, a27–29) – but (*II.a.ii*) what incites movement is already actually such as what it moves becomes by movement (257b9), since (*II.a.ii.i*) for instance what heats is what is hot (257b9); and (*II.a.ii.ii*) generally, what already has the form generates it in what it moves (257b10, cf. *Ph.* 3.2, 202a9–12, *GC* 1.7, 324a9–14).

Commentary

This third topic of the series supporting the conclusion *B.I.2*, that a self-mover is moved by a part that is an unmoved mover, is a key part of the argument. Argument *I* appeals to the principle from the partly similar argument *III.I.2* (256b27–257a14, supporting *B.I.1*) that the same single thing cannot both cause and undergo the same change at the same time. Argument *II* gives this a theoretical basis, which Simplicius (1235.30–32) succinctly formulates as a syllogism: insofar as it is moved everything moved is incomplete, but insofar as it incites movement no mover is incomplete; thus insofar as it incites movement no mover is moved.

Waterlow (1982, pp. 252–253) discusses the difficulty of applying to locomotion the model of moving causation in Argument *II*, whereby the cause transmits its own actuality to what it moves, and the latter becomes like it, as when what is hot heats something else (257b9–10, here *II.a.ii* and support). She argues that if something transmits locomotion to something else, the relevant change is not locomotion but the beginning of locomotion, and either locomotion is paradoxically a complete actuality, or else the agent too is in incomplete actuality, contrary to the model. Perhaps instead we should consider the agent's relevant actuality as its occupying a location; but not all locomotion involves being drawn to where the agent is, so the model must be relaxed in that case, to allow that what is moved is on the way to a different, although related, location. Aristotle's primary case of locomotion, carrying, is still hard to adapt to the model. A further problem arises in that everlasting rotation does not have a terminus in this sense at all.

Meyer (p. 66) apparently confuses Aristotle's distinction here within a self-mover with the distinctions at 256b13–24 between unmoved mover, moved mover and moved thing (see below on Argument *B.II* for an unmoved first mover, pp. 156–158); thus she wrongly infers that Aristotle thinks there will be a moved mover between mover and moved in a self-mover, something excluded by 258a5–20 below, (*B.I.2.5* within the present argument for an unmoved

mover). King (p. 275) cites Duns Scotus, *Ord.* II.d.2 p. 2 q. 5 n. 474 (Vat. 7.369), an interesting attempt to reject Aristotle's position here from within an Aristotelian frame of reference, as not ruling out a non-organic irreducible self-mover, which, *qua* homogenous, would possess active and passive characteristics as a whole.

Notes

At 257b3–4, here *I.a.i*, Simplicius (1234.23–1235.7) reports Alexander's suggestions that in the expression "being one and indivisible in form" (ἐν ὃν καὶ ἄτομον τῷ εἶδει) either both refer to what is moved as one in number (which Simplicius prefers), or else that "indivisible in form" refers to the movement (linguistically implausible, but supported in Alexander fr. 626 Rashed).

At 257b7, here *II.a.i.ii*, cf. Graham (1999, p. 97), following Waterlow (1982, p. 244), and similarly Philoponus (834.25–26) for the interpretation of δυνάμει κινούμενον as "in movement by potentiality", not "potentially in movement" (but note it is unnecessary, in 257b7–8, here *II.a.i.iii*, with Philoponus, 834.26–27, to interpret δέ as if γάρ, giving a reason). While the moveable, as such, is potentially in movement, that is not relevant to the argument here, since the actuality to which potential here is correlated, as the rest of the argument shows, is that of the end, *qua* complete, not movement as such (cf. Alexander fr. 627 Rashed). The incomplete actuality in which movement itself consists is identical with the potentiality referred to here (257b8–9, here *II.a.i.iv*). Aristotle's definition of movement as "the actuality of the potential as such" (*Ph.* 3.2, 201b33, cf. b24–25, 202a2) is debated, scholars differing over whether he means that movement is the actuality which a given potential is the potential *for*, or whether this potential is for the end in which a movement results; again, on the latter view, there is dispute over what he means by actuality. See further Wicksteed (vol. 1, trans. p. 195), Ross (p. 537), Kosman (1969), cf. (1994a, pp. 128–132), Penner (1970, pp. 427–433), Hussey (1983, pp. 58–60), Kostman, and Gill (1989, pp. 188–189). It seems clear that here the definition refers to a potential for the end to which movement leads (thus 257b9–10, here *II.a.ii* and justification), and that Aristotle here rephrases the definition so it refers to the incomplete actuality of the end, rather than the active operation of the potential for the end.

At 257b10, here *II.a.ii.ii*, see Gill (1989, p. 198) who explains briefly the principle that what has a form generates another instance. Graham (1999, p. 97) discusses the range of this principle in relation to other kinds of causation in Aristotle. Aristotle apparently thinks it applies to all instances of natural mov-

ing causation, literally among perishable things (father produces son, what is hot heats, etc.), and in cosmic cases by production of an ontologically degraded image of the cause (terrestrial species of the sun's movement, *de An.* 2.4, 415a27–b8; the elements of the heavens, *Metaph.* 9.8, 1050b28–30, 12.6, 1072a9–18, *GC* 2.10, 337a2–6; some would add the activity of the heavens, as an image of the prime mover's actuality, *Metaph.* 12.6–7). See also Simplicius (1235.37–1236.31), following Alexander (fr. 628.3–6 Rashed, and cf. Philoponus 834.28–835.9) and Theophrastus.

Note on Ch. 5, 257b13–258a5: (*B.I.2.4*) The Unmoved Mover in a Self-mover

This is the centre of Aristotle's Argument *B.I.2* that a self-mover is moved by an unmoved part, establishing that (4), of the self-moving whole, one part incites movement while being unmoved, and the other is moved (258a1–2), because only thus can the whole be self-moving (258a2). The latter follows from two subordinate results, (4.1) that the part of a self-moving whole causing movement must not be intrinsically moved (supplied), supported by an argument by exclusion of alternatives (257b13–258a1), at which point the conclusions stated above occur, and (4.2) that, since there is a part inciting its movement, a self-mover is moved primarily by that part, not by itself as a whole (supplied), on the basis of an argument given at 258a3–5 concluding *B.I.2.4*. The argument by exclusion of alternatives for 4.1 takes up most of the passage 257b13–258a5, containing a series of sub-arguments.

In order to make its overall structure quite explicit it is useful to supply a first Subsection 4.1.1 setting out some assumptions Aristotle makes about the alternatives, with two main premisses, (1.a) that if the part inciting movement in a self-mover is not unmoved, it must be moved either by another part or by itself, and (1.b) that if this part is moved by another part, these parts must move each other reciprocally, because (1.b.i) otherwise something external first incites movement. With this supplied clarification of the argumentative structure cf. similarly the remarks by Zekl (p. 287, ns. 82–83).

Assuming these points without comment, Aristotle actually gives us initially an argument, here 4.1.2 following, excluding reciprocal causation (257b13–26), itself apparently supported by four separate sub-arguments, (I) from the lack of causal priority among reciprocally acting parts (257b15–20), (II) from the possibility of incidental non-movement in that case (b20–23), (III) a repeat argument from the necessity for movement (b23–25), and (IV) from the contradictory processes required in reciprocal causation (b25–26). Then comes 4.1.3,

the argument excluding movement by a first self-moving part of a self-mover (257b26–258a1).

Ch. 5, 257b13–26: (4.1.2) Excluding Reciprocal Interaction of a Self-mover's Parts

That there is nothing that moves itself in such a way that each of the two parts is moved by the other is obvious from the following. For firstly there will be no first mover, if each part is ⟨indirectly⟩ going to move itself, (for what is prior is more responsible for the being moved than what is subsequent, and will more properly incite the movement; for we saw it was possible to incite movement in two ways, the one where what incites movement is itself moved by something else, the other where it does so by itself; and what is further from what is moved is nearer to the principle than the intermediate mover is). 257b14
b15
b20

Furthermore what incites movement need not be moved if it is not moved by itself. Thus the other moves it in return ⟨only⟩ incidentally. So then I can take the possibility of it not moving ⟨the first⟩. Thus the one is ⟨only⟩ moved, and the mover is unmoved. Furthermore what incites movement need not be moved in return, but either something unmoved must incite movement, or something moved by itself, if there must always be movement. Furthermore ⟨in the latter case⟩ it would be moved with the movement it incites, so that what heats is being heated. b25

Introductory Note

Here Aristotle seems to give four separate reasons (I–IV) for the conclusion that the parts of a self-mover do not move each other reciprocally (257b13–15). (Each of Arguments II–IV is prefixed again to the *Commentary* on it below.) Regarding the number of arguments here see the *Note* following the *Commentary* on Argument IV below, (pp. 144–145).

Argument I for 4.1.2, against Reciprocal Interaction of Parts (257b15–20)

Analysis

In Argument I, from the lack of causal priority between reciprocally moving parts, Aristotle rejects reciprocally moved parts, because (a) there must be a first mover (supplied: cf. 256a10–13); but (b) there would be no first mover if each part moved the other reciprocally (257b15–16), because (b.i) the prior mover in a series is more properly the mover (more responsible for the move-

ment) than what follows (257b16–17, cf. 256a10–13 above), since (*b.i.i*) there are two ways a mover incites movement: either being moved by another, or by means of itself (257b17–19); while (*b.i.ii*) what moves something by means of itself is first in such a series (supplied: cf. 256a27–28, a32–33 above); and (*b.i.iii*) what is first in the series, or nearer to it, is more properly the mover (supplied: cf. 256a10–13 above) – but (*b.ii*) neither part would be more properly the mover if each moved the other reciprocally (supplied), because (*b.ii.i*) each part would more properly move itself (257b16), since (*b.ii.i.i*) each is prior to the other in the ascending series of movers of its own movement (supplied), because (*b.ii.i.i.i*) what is further from what is moved is closer to the principle than the intermediate is (257b19–20).

Commentary

On this reconstruction the key to understanding the argument is that each part, *qua* mover, is compared not with the other part *qua* mover of it or moved by it, but with the other as in a parallel way a putative first mover *of itself*, and the crucial step is 257b16, here *b.ii.i*, implying *b.ii*. The *Analysis* follows Ross (p. 701) and Simplicius (1237.26–1238.29); cf. Philoponus (835.10–16), and Wagner (p. 680). Simplicius (1238.29–34) seems to differ only in emphasis from what he reports as Alexander's interpretation, and Alexander (fr. 629 Rashed, *contra* Rashed, p. 552) may give a different interpretation, that, since each part is both prior and posterior to the other, it is equally so to itself; cf. Philoponus (886.24–26). Aquinas (8.1055) has yet another view, that the point here is that what moves itself (by means of the other part) would be no closer to the first principle of movement than what is moved by another, contrary to the principle stated here at 257b19–20, here *b.ii.i.i.i*. Graham (1999, p. 98) provides a four-step representation corresponding to *a* and *b* alone, without analysis of their support; he considers the argument unpersuasive, mistakenly thinking only the whole self-mover would be a first mover, not any part. Yet if the whole moves itself because the parts move each other, the parts are movers prior to the whole as a mover, which thus cannot be the first mover.

Zekl (p. 287 n. 80) does not recognise the relationship between the two main parts of Argument *B.I* of Part *B* of the chapter, supporting respectively the Premisses *B.I.1* and *B.I.2* (for which see the *Introduction* to the chapter, p. 105), and mistakenly regards the present argument as a more succinct alternative to Argument *III* for *B.I.1* above (256b3–13 & 256b27–257a27); see further also the *Note on Ch. 5*, 256a13–b24 & 256b27–258b9: (*B*) *unmoved first movers* (esp. p. 109), and *Commentary* (ad loc., pp. 119–130).

*Argument II for 4.1.2, against Reciprocal Interaction of Parts
(257b20–23)*

Furthermore what incites movement need not be moved if it is not moved by itself. Thus the other moves it in return (only) incidentally. So then I can take the possibility of it not moving (the first). Thus the one is (only) moved, and the mover is unmoved. 257b20

Analysis

By Argument II, from the non-necessity of the mover being moved, Aristotle infers that a self-mover cannot have reciprocally moving parts, because (a) in that case, one part might be only moved and the other an unmoved mover (257b22–23), since (a.i) the one that is moved only moves its mover in return incidentally (b21), since (a.i.i) it is not necessary that the mover is moved (b20), because (a.i.i.i) it would only be necessary if it were moved by itself (b20–21; see 256a13–b13 & 256b27–257a31, *B.I.1* above, with *Commentary*, pp. 109–131) – but (b) it would not be possible for one part to be unmoved if each part had to move the other reciprocally for the whole to be moved (supplied).

Commentary

Aristotle here argues from premisses to conclusion, which the *Analysis* reverses. Most problems with this argument can be avoided by noting that the subject of “moves ... in return” (ἀντικινεῖ, 257b21, here *a.i*) is “the other” (θάτερον). Otherwise there is a logical difficulty in accounting for Aristotle’s introduction of the conception of incidentally causing movement (257b21, here *a.i*), when the primary assumption concerns incidentally undergoing movement (b20–21, here *a.i.i–a.i.i.i*), whereas here *a.i* (b21) follows naturally from *a.i.i* (b20), since there is a change of subject corresponding to the change from incidentally undergoing (in *a.i.i*) to causing (in *a.i*) movement. Aristotle cannot suppose causing movement is due to being in movement, and correspondingly incidental, *in the same subject* because then the postulate that one part does not cause movement (b22) would exclude the possibility of there being an unmoved mover (b22–23, here *a*). Rashed (p. 553) suggests altering κινεῖν (‘incite movement’) to κινεῖσθαι (‘be moved’) in b22, here (*a*), but this leaves b21, here (*a.i*), awkward, unless taken as here, in which case the textual change is unnecessary.

The overall reconstruction here follows Ross (p. 701), according to which 257b20–21, here (*a.i.i.i*) appeals to the result of *B.I.1*, the first half of the main overall argument for unmoved first movers, that a first mover must be either unmoved or self-moved; cf. Wagner (pp. 680–681). This implies that if the parts

were reciprocally moved, the externally caused movement of each would be incidental to its causal activity (in which case reciprocal action is not necessary in a first cause). This is easier than supplying as a reason why each mover need not be moved unless moved by itself (b20–21), e.g., (**a.i.i.i.i*) that neither can ensure that the other is moved, and each depends on the other to be moved. Graham (1999, pp. 98–99) provides a four-step representation of this argument differing in structure and content, but without close reference to the text. His criticism that the premisses do not imply that one part must be moved, and the other a mover (that is unmoved), overlooks the hypothetical modality of Aristotle's choice of one putative possibility among those implied if incidental reciprocal causation had been possible (257b22, and cf. here *a*, with *b*).

Argument III for 4.1.2, against Reciprocal Interaction of Parts
(257b23–25)

257b23 *Furthermore what incites movement need not be moved in return, but*
b25 *either something unmoved must incite movement, or something moved*
 by itself, if there must always be movement.

Introductory Note

I treat this as a separate argument with great hesitation; it begins with ἔτι ('furthermore', 257b23), Aristotle's usual indication of a new argument (cf. b20, b25), although Prantl corrected this to ἐπεὶ ('since'). Ross (p. 701), following Simplicius (1239.24–32) and cf. Aquinas (8.1057) thinks this argument differs from the preceding one (257b20–23) only by the reason why there must be either an unmoved or self-moved first mover, that movement must be everlasting. This leaves it poorly motivated, while Graham (1999, p. 99) admits he cannot see the point, but surveys earlier interpretations. Cherniss (p. 390 n. 310) treats the conclusion that any first mover must be either unmoved or self-moved (b24–25) as an additional premiss of the previous argument, along with b20–21 (that a first mover only need be moved if self-moved), supporting the claim that if each part moved the other, it would move it incidentally (b21: contrast *a.i* above), but by itself b24–25 immediately implies the parts need not move each other reciprocally.

There are three particularly suspicious features of 257b23–25: (i) the first sentence's first clause (ἔτι οὐκ ἀνάγκη τὸ κινεῖν ἀντικινεῖσθαι, "Furthermore what incites movement need not be moved in return", b23–24) is identical, except for the prefix of ἀντικινεῖσθαι ("be moved *in return*") with the first clause of the preceding Argument *II* (b20), while ἀντικινεῖσθαι implies the correct

interpretation of the second sentence of Argument *II* (“Thus the other moves it in return (only) incidentally”, b21, above *a.i*); (ii) the second sentence (“but either something unmoved must incite movement, or something moved by itself”, b24–25) expands precisely the implications of the second clause of the first sentence in Argument *II* (“if it is not moved by itself”, b20–21); and (iii) the final clause (“if there must always be movement”, b25), which scholars above regard as a difference, is nevertheless a plausible explanation of why in Argument *II* the mover still must act although not being reciprocally moved. Thus the present passage is quite possibly a marginal explanatory gloss of Argument *II* mistakenly included in the text at an early date. Nevertheless the following analysis shows how it might otherwise be treated as an independent argument, in accordance with the tradition.

Analysis

As an argument from the necessity for movement, this passage can be taken to conclude that a first mover does not consist of reciprocally moving parts (supplied), since (*a*) any first mover must be either unmoved or self-moved (b24–25), because (*a.i*) a mover is not necessarily moved by whatever it moves (b23–24); but (*a.ii*) first movers must always be able to cause movement (supplied), because (*a.ii.i*) there must be movement always (b25, cf. *Ph.* 8.1–2) – while (*a.iii*) a moved mover that is not necessarily moved will not always be able to cause movement (supplied).

Commentary

As Argument *III* this draws explicitly on the premiss in Argument *II* that a part causing movement is not necessarily moved by whatever it moves (b23–24, here *a.i*; cf. b20 and b21), and may be taken as demonstrated there. The ambiguity of the connective ‘but’ ($\delta\lambda\lambda(\acute{\alpha})$, b24) allows for an inference in either direction (or not at all). Here the inference from b23–24 (*a.i*) to the claim that a first mover is either unmoved or self-moved (b24–25, here *a*) does not exactly reverse that from the partly similar b20–21 to b20 and b21, since *a* here is assertoric. The first supplied premiss here, *a.ii* (that first movers must always be active), taken as following from 256b25, here *a.ii.i* (that movement is everlasting), might seem a fallacy of distribution, but it is probably defensible, on the grounds that if any first mover needed to be made active (moved) in turn in order to incite movement, all might (whether or not it were possible that all together, each being finite, are otherwise capable of sustaining everlasting movement, or only a single everlasting mover is); but then there would be no necessity of everlasting movement.

Wicksteed’s translation (p. 333), construing the argument as treating the

everlastingness of movement as an established truth some might wrongly have explained in terms of the reciprocal interaction of two parts of an everlasting self-mover, reduces the argument to an assertion, but it is unlikely Aristotle would then have used εἴπερ (257b25) rather than ὅτι or ὥς (causal).

*Argument IV for 4.1.2, against Reciprocal Interaction of Parts
(257b25–26)*

257b25

Furthermore (in the latter case) it would be moved with the movement it incites, so that what heats is being heated.

Analysis

Argument IV, from contradictory processes, denies reciprocal interaction of parts in a self-mover, since (a) each such part would undergo contradictory processes at the same time (supplied), because (a.i), for instance, the same part that was heating the other, would be being heated by it at the same time (257b26), since (a.i.i) each would be moved with the same movement it incited in the other (257b25–26) – but (b) this is impossible (supplied: see 256b34 and 257a12 in Argument B.I.1.III above against the universality of externally moved movers, pp. 124–127).

Commentary

Ross (p. 701) notes that the argument here is that reciprocal action would involve each mover, and thus each moved part, already having the same form it produces in the other; similarly, Wicksteed, p. 332 n. b, following Simplicius and Alexander (Simplicius 1239.35–1240.19). Graham (1999, pp. 99–100) asserts that the lines do not constitute a compelling objection to reciprocal causation, given the division of a self-mover into different parts, apparently mistakenly thinking the contradictory processes would only coincide in the whole, not in each part also.

Note on All Four Arguments

The Latin translation attached to Aquinas (*textus* 825–830 with 8.1055–1058) and those printed with Ibn Rushd (*LC* 380F13–L7) distinguish the four arguments here (257b13–26) as each directed against reciprocal causation, as do Alexander (frs. 629–632 Rashed) and Simplicius (1237–1240), although Aristotle's Greek text is not so clear, and Argument III (257b23–25) very possibly originated in a marginal gloss on II (see the *Introductory Note*, pp. 142–143), while Argument IV (257b25–26), even allowing it is quite separate, is possibly directed against the idea of a first moved mover as such.

With hesitation I follow this count, although as noted above Argument *III* at the very least draws a premiss from Argument *II*, and Argument *IV* might be meant to form with the preceding passage 257b23–25 a single complex argument for an unmoved mover, by excluding reciprocal and self-moving causation. While in Argument *I* the supposition “if each part is going to move itself” (b16), along with “if it is not moved by itself” (b20–21) in Argument *II*, might suggest Aristotle intends a dilemma within one complex argument by exclusion, on closer inspection it appears that these expressions are not complementary, since self-movement in the first case refers to one part indirectly moving itself by the other, whereas in the second it is an alternative to the other moving it.

Aquinas (8.1055) argues that all four recycle arguments used previously: Argument *I* here (257b15–20) adapts 256a4–b3 (from the beginning of the chapter, including Arguments *B.I.1.I* and *B.I.1.II* for a first self-moving or unmoved mover); Arguments *II* (b20–23), and separately *III* (b23–25), adapt 256b7–13 (there Sub-argument *III.1.1*, against universally incidentally moved movers, within *B.I.1.III* above); and Argument *IV* (b25–26) adapts 256b34–257a3 (there Sub-argument *III.1.2.1*, against a mover being moved with the same movement it incites, within Argument *B.I.1.III* above).

Ch. 5, 257b26–258a1: (4.1.3) Exclusion of a Self-moving Part

But in fact neither one part, nor several parts of what first moves itself each move themselves. For if the whole is moved by itself, it is either moved by something belonging to itself or the whole is moved by the whole. Now if it is by some part being moved by itself, this would be that which first moves itself. (For even if it is separated this will move itself, but the whole no longer will.) But if the whole is moved by the whole, these parts would move themselves incidentally, so that, if it is not necessary, let us assume that they are not moved by themselves.

257b26
b30
258a1

Introductory Note

Here, after showing (*B.I.2.3*) that a whole is neither self-moving as a whole (257b2–13) nor (*B.I.2.4.1.2*) due to the reciprocal action of parts (257b13–26), Aristotle now (4.1.3) excludes the possibility that any part primarily moves itself. From this it follows (*B.I.2*) that the mover must be intrinsically unmoved.

Analysis

The argument here excludes a self-moving part (257b26–27), because (a) if the whole (containing self-moving parts) moves itself, either it is moved by some self-moving part, or by the whole (257b28–30); but (b) it cannot be moved by a self-moving part (supplied), since (b.i) if it were moved by a self-moving part, that part would be the self-moving whole (257b30–31), because (b.i.i) if separated, this part would move itself, but the whole would no longer do so (257b31–32) – while (c) if it is moved by itself as a whole, we may assume that the parts do not move themselves (257b32–33, 257b34–258a1), because (c.i) in that case the parts do not move themselves necessarily (257b34), since (c.i.i) in that case the parts only move themselves incidentally (257b33–34).

Commentary

Graham (1999, p. 100) claims the overall conclusion at 258a1–2, that a self-moving whole must contain an unmoved mover and a moved part, is meant to follow directly from this argument alone, but that leaves unexplained the contribution of the arguments against a self-moving whole and reciprocally moving parts; cf. the *Introductory Note* directly above. Wagner's dissatisfaction (p. 681) with this passage apparently results from not recognising that it is a separate argument against a distinct possibility, and that Aristotle has nowhere excluded a mover part incidentally moved together with what it moves (see 258a1–5, following) and assumes throughout the possibility of a complex self-mover: see further the *Note on Ch. 5, 257b13–258a5: (B.I.2.4) the unmoved mover in a self-mover* (pp. 138–139). (The references to what is unmoved in 257b23 and b24, and generally in 257b13–26, mean only *not necessarily moved*, except where Aristotle explicitly hypothesizes that what is only incidentally moved is not moved, which possibly confuses Wagner.)

Aristotle's treatment of this topic, as physics, is entirely general, and does not indicate his account of how, for instance, we ourselves are moved, as self-moving complexes in his terms. In Aristotelian terms, we might today propose that either the brain, something associated with it, or the nervous system, is a self-moving part of us, as the originating source of locomotion, which Aristotle calls animal self-movement. He might reply formally that such a material part (although he would deny it is the brain) depends on the rest of the body for nutrition and sensory and other input, and so is not independently self-moving, or else refer us to his *De motu animalium*, esp. Ch. 10, or *De anima*, esp. 3.9–12 for his own doctrine.

Ch. 5, 258a1–5: (4.2) Priority of the Part Inciting Movement in a Self-mover

Thus of the whole <represented by this line> the one part will incite movement while being unmoved and the other will be moved. For only so is it able to be self-moved.⁷ Further if the whole moves itself, one part of it will incite movement, and the other will be in movement. Thus AB will be moved by itself and by A. 258a1
a5

Introductory Note

Aristotle here first (258a1–2) gives the general conclusion to the whole of *B.I.2.4*, central to the argument that a self-mover consists of an intrinsically unmoved mover and a moved part. See further, above, the *Note on Ch. 5, 257b13–258a5: (B.I.2.4) the unmoved mover in a self-mover* (pp. 138–139). As the insertion in the translation at 258a1 indicates, since Aristotle has switched without comment from the neuter to the feminine of ‘whole’, we should understand it in agreement with γραμμή (‘line’), referring to a diagram originally used in lectures or in the text; cf. Ross (p. 703) *ad* 258a26 and Simplicius (e.g., 1242.36–37). Aristotle then uses the labels A and B for lengths of the line to indicate that a self-moving whole AB is divided into two parts, the mover A and the moved part B. This does not imply that the mover A is physically extended: see below, 258a20–21 in *B.I.2.6* (pp. 150–151) and 258b1 in *B.I.2.8* (pp. 152–154); the diagram is implied throughout all remaining topics in the proof of the unmoved mover.

Analysis

Previously (4.1) Aristotle argued that the mover within a self-moving whole must not be intrinsically moved (257b13–258a1). Argument 4.2 now shows that this unmoved mover primarily causes the movement of the whole (supplied), because (a) the self-mover is admittedly moved by itself as a whole AB (258a4); but (b) it is also moved by the part A inciting movement (258a4–5), because (b.i) one part, A, is what moves it and the other, B, is what is moved (258a3–4) – while (c) it moves itself as a whole AB because that one part A moves it by moving the moved part B (supplied).

⁷ Rashed (p. 556) argues that Alexander (fr. 635 Rashed) shows that this sentence is a gloss intruding into the text; cf. Wagner (p. 681).

Commentary

This generally follows Ross (p. 702), who identifies a distinct argument here, that, since it has been demonstrated that a self-mover contains an unmoved mover, the notion of a self-mover is not strictly correct because we would be attributing the movement inconsistently to two distinct causes. Graham (1999, pp. 100–101) also follows Ross. The *Analysis* here differs only in two respects: it treats this argument (notwithstanding $\xi\tau 1$, 258a3) as introducing a new point, not arguing again that the mover part of a self-mover is unmoved, but that this part is the primary mover of the whole; and it assumes the hierarchical notion of causation from the start of the chapter (256a10–13). Aquinas (8.1061) and Wicksteed (p. 332 n. c) regard the present passage as an alternative statement of the argument against a self-mover moved by a primarily self-moving part at 257b30–32 (in the previous Argument 4.1.3; see the supplied Premiss *b* and support), but AB at 258a4 must be the whole mentioned in the previous line, not its internal mover. Simplicius (1242.15–20), rejecting Alexander's unconvincing speculation about an argument against self-moving parts also moving each other (cf. Alexander fr. 636 Rashed), effectively claims there is no argument here, merely a more persuasive restatement of the result at 258a1–2 (the general conclusion to *B.I.2.4*, that the mover in a self-mover is unmoved).

Ch. 5, 258a5–20: (*B.I.2.5*) Uniqueness of the Directly Moved Part

258a5 *And since one thing incites movement while being moved by something else, and another while being unmoved, and one thing is moved while inciting movement, and another while moving nothing, what moves itself must be composed of what is unmoved but incites movement, and in addition of what does not necessarily move anything, but only whatever it does by chance. For let A be what incites movement while being unmoved,*

a10 *and B be what is moved by A and moves that to which C is applied, and this be what is moved by B but does not move anything. For since it will come at some point through several intermediaries to C, let it be through only one. The whole ABC moves itself. But if I remove C, while AB will move itself, A inciting movement and B being moved, C will not move itself, nor be in movement at all. But in fact neither will BC move itself without A.*

a15 *For B incites movement by being moved by something else, not by being moved by any part of itself. Thus AB alone moves itself. Thus what moves itself must contain what incites movement but is unmoved, and what is*

a20 *moved but does not necessarily move anything, ...*

Analysis

Aristotle argues that a self-mover must be composed of an unmoved mover and just one moved part, which does not necessarily move anything further (258a6–8, a18–20), because (a) A (on Aristotle's diagram) is what moves while itself unmoved (258a9), since (a.i) one kind of mover is moved by something else and another is unmoved (258a5–6) – and (b) B is what is moved by A and moves something else, and C is what is moved (directly) by B but moves nothing else (258a9–10), because (b.i) one kind of moved thing is a mover and another not (258a6); and (b.ii) although there could be further intermediaries between B and C, they are not necessary (258b11–12), because (b.iii) they would have the same status as B, moved movers (supplied) – but then (c) AB alone (necessarily) moves itself as a whole (258a17–18), because (c.i) only A and B are indispensable to a self-moving whole (supplied), since (c.i.i) ABC moves itself as a whole (258a12–13); but (c.i.ii) AB also moves itself as a whole without C (258a13–14), since (c.i.iii) A incites movement, and B is moved (258a14) – and (c.i.iii) C alone will not move itself, or be moved at all (258a14–15); but (c.i.iv) BC will not move itself without A (258a15–16), because (c.i.iv.i) B moves by being moved by something else, not by being moved by some part of itself (258a16–17) – and (c.i.v) A alone will not move itself (supplied: cf. 257b26–258a1), because (c.i.v.i) A is intrinsically unmoved (supplied: see 258a1–2).

Commentary

On Aristotle's references to a diagram by letter names in the text see the *Introductory Note* to 258a1–5 above (p. 147). The argument here depends on three main premisses, each supported by subordinate arguments, the first two (which could otherwise be treated conditionally) specifying the elements of the diagram.

Note

Regarding 258a13–14, here c.i.iii, Simplicius (1243.9–38) asks why Aristotle does not conclude that A and C together constitute a self-mover; influenced by the mention of one-way contact immediately following (258a20–21 in *B.I.2.6* below, pp. 150–151), he answers that B represents what is naturally connected with the mover, as the body is to the soul; cf. Philoponus (835.24–836.5). Graham (1999, p. 101) proposes a possible counterexample, where A = soul, B = heart and C = body, suggesting Aristotle supposes what is first moved by an unmoved mover cannot be a part of a larger moved natural whole. This is consistent with the solution to the problem posed at 258a27–b4 (below in *B.I.2.8*), that if certain parts are removed from a self-moving whole, either from the moved part, or if possible the mover, what remains no longer has the same nature and is no

longer self-moving. On the other hand in *MA* Ch. 10 Aristotle identifies the ‘innate breath’ in the heart as an animal’s first moved part; but whether this is as the material cause (the instantiation) of the desiring soul, or something moved by the latter is not entirely clear (note *MA* Ch. 6, 700b35–701a1, Chs. 9–10, 703a1–6 and *de An.* 3.10, 433b13–27); cf. Corcilius (pp. 268–269 and 302–303).

Ch. 5, 258a20–22: (*B.I.2.6*) Contact Between the Parts

258a20

... either both touching each other or one the other. So if what incites movement is continuous (for what is moved must be continuous), each will touch the other.

Analysis

Aristotle here argues that either one or both parts of a self-mover must touch the other (258a20–21), since (*a*) what is moved touches the unmoved mover if the unmoved mover is continuous (258a21–22), because (*a.i*) continuous bodies are touchable (supplied), since (*a.i.i*) things that touch have their edges together (supplied: see *Ph.* 5.3, 226b23); and (*a.i.ii*) all continuous bodies have edges (supplied: cf. *Ph.* 3.5, 206a7–8) – while (*a.ii*) what is moved must be continuous (258a21–22, = 257a33–34 in (*B.I.2.2*) above) – and (*b*) the unmoved mover must touch what is moved (supplied: see *GC* 1.6, 323a25–32), because (*b.i*) continuous bodies are touchable (supplied: = *a.i* above); and (*b.ii*) what is moved must be continuous (258a21–22, = *a.ii* above); while (*b.iii*) what incites movement does so by touch (supplied: see *Ph.* 3.2, 202a6–7).

Commentary and Notes

The reasoning in the *Analysis* has been elaborated illustratively to show what Aristotle means here, by appeal to standard results from his physical doctrine.

Aquinas (8.1063–1065) notices that a distinct point begins here at 258a20, but separates a20–21 (as concerning how the parts are joined) from a21–22, taking that with the following section (a22–27) about how the self-mover moves itself. Simplicius (1243.21–1244.10; cf. similarly Solmsen, 1960, p. 193) takes 258a20–21 by contrast with the previous section (see the *Note* above on 258a13–14, p. 149). The division here between *B.I.2.6* and *B.I.2.7* differs in one respect or the other from both views. Interpretation diverges here partly because most manuscripts lack ἄψεται ἑκάτερον ἑκατέρου (“each touches the other”, 258a22), spoiling the grammar (cf. Simplicius 1244.13–22, Philoponus 836.26 and Ross, p. 703).

On 258a20–21, the conclusion, Aquinas (8.1064) remarks that Aristotle leaves it an open question whether what is moved touches the mover, since he has not yet demonstrated that the first mover has no magnitude. Yet Aquinas also claims that *Ph.* 8.4, 255a12–18, arguing from their continuity that elemental bodies cannot be self-movers, implies that the two parts of the self-mover cannot be continuous. But continuity in that stronger sense is equivalent to homogeneity, more than would be required if a self-mover were an organic whole of mover and moved bodily parts. This lesser sense of continuity Aquinas recognises only as mutual contact, but Aristotle makes use of a wider range of meanings of continuity (see *Ph.* 5.3, 227a11–18). Aquinas here thinks of the possibility of one-way contact between incorporeal mover and moved body in a literal sense, as does Philoponus (836.12–24) who clearly alludes to *de An.* 1.1, 403a16–b19 and *MA* 6–10, whereas Simplicius (1243.27–28, 35) treats it as metaphorical, following Alexander (fr. 640 Rashed) citing *GC* 1.6, 323a31–32. Gill (1994, p. 26) wrongly claims that Aristotle here affirms that contact is only one-way, citing 258a21–22, but see *a*, *a.ii* and *b.ii* above for the roles of these claims. Seeck (p. 147) infers, from the fact that 258a27–30 (see *B.I.2.8* below, pp. 152–154) allows that an unmoved mover might have magnitude, that the allowance here (a20–21) that it might not could be a later insertion, but there is no contradiction or incoherence if the case has not yet been decided (cf. Ch. 10).

Ch. 5, 258a22–27: (*B.I.2.7*) Requirement for Joint Action

Now it is clear that the whole does not move itself by one part of it being of such a kind as to move itself, but it moves itself as a whole, both being moved and inciting movement by part of it being the mover and part what is moved. For it does not incite movement as a whole, nor is it moved as a whole, but the ⟨line to which⟩ A ⟨is applied⟩ incites movement, and that ⟨line to which⟩ B ⟨is applied⟩ alone is moved. [But C is no longer moved by A, for it is impossible.⁸]

258a23
a25

Analysis

Here the conclusion is that a self-mover AB can only move itself as a whole owing to the joint action of both its two parts A and B (supplied), because (a)

8 Sc. for C to be part of what moves itself (cf. 258a17–18), but excised by Ross (see p. 703) as the gloss of a scholar who thought ‘B alone’ meant B without C, not B without A.

the whole moves itself, inciting movement and being moved, by part of it being what incites movement and part what is moved, and not by some part of it being able to move itself (258a22–25), since (a.i) it does not incite movement as a whole, nor is it moved as a whole (258a25–26); rather (a.ii) one part, A, incites movement, and the other, B, is moved (258a26–27).

Commentary

This is perhaps not by intention a separate argument, but a re-statement of the implications of the diagram of a self-mover that 258a5–21 (*B.I.2.5* above) presupposes, yet it implicitly makes the very point the subsequent difficulty challenges (258a27–b4, *B.I.2.8* below; cf. Aquinas 8.1066), so it is best to present it here as a distinct argument. Both Simplicius (1244.24–30) and Aquinas (8.1065) take it with the preceding sentence, explaining why a whole composed of mover and moved parts is said to move itself, while Furley (1994/1978, p. 4) calls it, as a whole, a conclusion.

Ch. 5, 258a27–b4: (*B.I.2.8*) Integrity of the Self-moving Whole

258a28 *But this involves a problem, if someone removes some part of the ⟨line to which⟩ A ⟨is applied⟩ (if what incites movement but is unmoved is continuous), or some part of the ⟨line to which⟩ B ⟨is applied⟩. Will the*
a30 *remnant of the ⟨line to which⟩ A ⟨is applied⟩ incite movement, or that of the ⟨line to which⟩ B ⟨is applied⟩ be moved? For if so, the ⟨line to which⟩ AB ⟨is applied⟩ would not be one moved primarily by itself; for when ⟨a line length⟩ has been removed from the ⟨line to which⟩ AB ⟨is applied⟩, the remaining ⟨line to which⟩ AB ⟨is now applied⟩ will still move itself.*
258b1 *Rather, nothing prevents either, or one of them, what is moved, from being divisible potentially, but indivisible actually, and if it is divided, from no longer being something with the same nature. As a result, nothing prevents it being found primarily in things that are potentially divisible.*

Introductory Note

The references to a diagram by letter continue, and the solution to the problem presented here effectively distinguishes between the features of the diagram that necessarily represent the subject, a self-mover as such, and those that are merely incidental results of its graphic representation, such as the implication that another similar smaller self-mover would result from actually dividing the lines.

Analysis

The problem, framed as an objection to the result so far, claims (1) that the whole AB, hitherto representing the self-mover, is not required for self-movement (258a30–31), because (1.a) if part of AB is removed, the remainder will continue to move itself (258a31–32), for two reasons, by Argument I because (1.a.I.i) if the unmoved mover A is continuous, part may be removed (258a27–29); but (1.a.I.ii) in that case the remainder will continue to incite movement (258a29–30), because (1.a.II.i) AB as reduced will still contain distinct moved and mover parts (supplied) – by Argument II because (1.a.II.i) anyway part of the moved part B may be removed (258b29); but (1.a.II.ii) if it is, the remainder will continue to be moved (258a29–30), since (1.a.II.ii.i) AB as reduced will still contain distinct moved and mover parts (supplied).

Aristotle responds (258a32–b4), (2) that the original whole AB must be assumed to be required for self-movement (supplied, contrary to 1 above), because (2.a) if part of AB is removed, the remainder need not be able to move itself (supplied, contrary to 1.a.I.ii), since (2.a.i) nothing prevents either A or B, or at least B, from being potentially divisible, but actually indivisible (258a32–b2, b3–4), since (2.a.i.i) this would be so if, when it was divided, there was no longer anything of the same nature left (258b2–3).

Commentary

The initial question reasonably follows that previously raised, whether something (C) further moved by the primarily moved part (B) is also part of the self-moving whole (i.e. ABC) (258a5–20, above *B.I.2.5*); the answer there ‘no’ now raises the question of the whole’s limits and integrity in relation to the diagrammatic model. Thus Aristotle here distinguishes what may be inferred about the subject of the diagram from what the characteristics of the diagram itself suggest, by reference to the nature of the subject. In other words he implicitly distinguishes between a physical (conventional) and a mathematical interpretation of the diagram.

Aquinas (8.1066) notes the implication that, if the remainder continues to move or be moved, not only was the original whole not a primary self-mover, but further (by repetition) nothing could be. Simplicius (1245.20–24; cf. 15–17) converts the problem into a dilemma, adding the alternative consequence that it would be strange if, with part removed, the remainder does not continue to move or be moved, given that Aristotle has shown that no part was what moves itself primarily (such as the part here removed, implying the remainder still will: cf. 258a22–25). Aristotle undoubtedly did not intend that.

Simplicius (1245.27–34) further compares the objection here with the argument at *Ph.* 7.1, 242a40–47 that what is moved must be moved by something,

since both appeal to the fact that if the remainder is still moved on its own, the original whole was not something primarily and intrinsically moved; Alexander (ap. Simplicius 1246.30–1247.10) is the origin of the comparison, but rightly thought it of limited applicability, since in the earlier book the part cannot be conceived as physically separated.

Following Alexander (ap. Simplicius 1246.16–30), Simplicius (1245.35–1246.16), Philoponus (836.33–837.3 = 837.14–21; cf. Ibn Bājja 207.1–214.7, cited by Lettinck p. 623) and Ross (pp. 703–704) interpret Aristotle's solution purely in terms of the distinction between potential divisibility and actual division, but this has the undesirable consequence that every actual physical division in a self-moving whole produces something of a different nature (cf. 258b2–3, here 2.a.i.i). Ross without comment prefaces this with the qualification “it is possible that”, but the basis for this (“nothing prevents”, b1, governing also b2–3) implies Aristotle's answer is more nuanced than the commentators admit, allowing both for cases where removal of some part is incidental to a self-mover's nature, and others where it is destroyed but (contrary to the commentators' view; cf. Philoponus 837.24–30) a new self-mover is not automatically created by the removal.

Graham (1999, pp. 102–103) more sensibly suggests that Aristotle's solution effectively treats it as an empirical question what things are self-movers, since we see in each case whether removing some part affects the capacity of the remaining whole for self-movement. Yet borderline cases, such as maimed animals, indicate that the integrity of a nature as an object of inductive generalisation is more relevant than experimentation. Graham also claims here that in Ch. 6 Aristotle shows that animals are not self-movers; but it is better to say that for Aristotle animals are indeed exemplary—and in fact the only—self-movers, although they do not move themselves in every respect, and are moved in some respects externally, so that a self-mover cannot be a first mover absolutely.

Ch. 5, 258b4–9: General Conclusion to Argument *B.I* for an Unmoved Mover

258b5

Therefore it is obvious from this that what primarily incites movement is unmoved. For whether ⟨the series leading back from⟩ what is moved, but moved by something in movement, comes to an end immediately with the first thing and that is unmoved, or with something moved, but which moves and stops itself, in either case what first moves all things in movement turns out to be unmoved.

Argument *B.I* begins at 256a13, first showing (*B.I.1*) that a first mover is either self-moved or unmoved, and then (*B.I.2*) that a self-mover in any case is moved by a distinct intrinsically unmoved part. See further, on the general structure of the chapter, the *Introduction* (esp. p. 105), and on Argument *B.I* the *Note on Ch. 5, 256a13–b24 & 256b27–258b9: (B) unmoved first movers* (pp. 108–111).

Note on Location here of Ch. 5, 256b13–27

This passage is clearly out of place in the manuscripts: the conclusion of these lines is that there is an unmoved mover, emphasized by the appeal to Anaxagoras, yet the preceding two arguments at its location in the text, 256a13–21 and a21–b3, here *B.I.1.I–II*, both conclude that if the first mover is moved, it is a self-mover, and they are followed by the announcement of a further argument to the same conclusion at 256b3–4, here *B.I.1.III*, a conclusion reached, after the present passage, at 257a26–27; and followed immediately by another similar argument at 257a27–31, here *B.I.1.IV*. Then Section *B.I.2*, that shows there is an unmoved mover, is announced as a new beginning (257a31–33), as if 256a13–b3 had not been there. Cf. Rashed (pp. 539–540) and Wagner (p. 678).

Simplicius (1224.26–36) reports that Alexander discussed scholars who apparently said all of 256b3–27 belonged after 258a5 (just before *B.I.2.5*, p. 148 above, but Simplicius' words suggest they proposed this as a correction, not on manuscript evidence; cf. on Themistius below). Alexander (fr. 606 Rashed; cf. Simplicius 1224.36–1225.10) and Simplicius (cf. 1226.12–22), thought it 'healthier' to retain the order in their and our manuscripts, treating 256b13–27 as a proof that among things both moved and inciting movement the self-mover is the first mover, but also showing that a self-mover is moved because of an unmoved mover. This is implausible, firstly, as noted, because nothing in the context suggests Aristotle aims to discuss this yet, and secondly, because such an important consideration is not subsequently mentioned until the question raised apparently for the first time at 257a31–33, how, if there is a self-mover, it incites movement, which only thereafter leads to the doctrine of an unmoved mover within a self-mover, generally implying all movement results from an unmoved mover.

Zekl (p. 286 n. 70) suggests the passage 256b13–27 is either from an earlier draft or a later note never properly elaborated. Similarly, Seeck (pp. 131, 170) regards it as a later insertion; his argument divides into three reasons (pp. 144–145) to connect it with Ch. 10, 267a21–b6, which he also regards as an insertion: (i) both distinguish an unmoved and moved mover (256b14–17, cf. 267a24–

b1, using the same distinctive verb *συμμεταβάλλει*, 256b17, cf. 267b2); (ii) both characterise the relationship between these two movers as asymmetrical; (iii) Anaxagoras' doctrine that the intellect is unaffected and unmixed (256b24–25) corresponds with the immateriality of the first mover in Ch. 10. Yet Seeck's (i) on its own seems fortuitous, given the generality of the distinction between moved and unmoved movers in Aristotle, while (ii) is too imprecise to be significant, and (iii) involves correspondence with a different part of Ch. 10 from the putative insertion there. Thus he does not show a sufficiently close connection to regard the present passage as a later insertion, rather than misplaced.

Themistius (222.23–223.6) summarises the first part of the passage (256b13–24) immediately before 258b4–9, the chapter's general conclusion, and 256b24–27 right at the end (223.11–12), suggesting the order of material in his text differed. Thus Cornford (1934, p. 336 n. 2) moves 256b13–27 to the end of the chapter, saying there is nothing in 256b3–13 for *τοῦτο* (b14), i.e., that the first mover is unmoved, to refer back to; Solmsen (1960, p. 234 n. 40) accepts there is a problem but rejects Cornford's transposition. Alexander (or a scholiast?: fr. 611 Rashed) glosses *τοῦτο* as the impossibility of no movement (256b12), but neither b13–15 nor what follows support that result as it would have to (note γάρ, b14); Ross (p. 698), followed by Graham in retaining the passage in its position in the manuscripts, asserts *τοῦτο* refers to the claim that there must be a mover not moved by something else; yet the ongoing (third) proof of this does not conclude until 256a26–27, and it makes no sense to confirm it here before the argument is complete.

Possibly at an early time someone copied the passage into the margin at 256b7–8, thinking mistakenly that the passage's account of an unmoved mover elucidated the words, “So firstly, if it is incidentally true, there is no need that what incites movement be in movement.” Here I follow Cornford and place 256b3–13 at the end of the chapter, since it makes perfect sense at this point. It contains two subsections, *B.II* (256b13–24), a second argument complementing the long Argument *B.I* that a first mover is intrinsically unmoved, and then (C) a confirmation of the result of the chapter, by agreement with Anaxagoras (256b24–27). *Metaph.* 12.10, 1075b8–10 also returns to Anaxagoras during a final summary of that book's achievements.

Ch. 5, 256b13–24: (*B.II*) Argument by Analysis of Principles

256b13
b15

And this result accords with reason. For three things are necessary, what is moved and what moves it and that by which it moves it. Then what is moved must be moved, but it need not incite movement; but that by which

something incites movement must both incite movement and be moved (for this changes with what is moved, since it is together in the same place with it. This is clear in the case of things that incite locomotion. For they must touch each other to a certain extent). But what incites movement in such a way as not to be that by which (it) incites movement, is unmoved. And since we see the last thing, which can be moved but does not have a principle of movement, and what is moved, not by something else but by itself, it is reasonable, if not strictly necessary, that there is the third thing, which incites movement while being unmoved. b20

Analysis

Here Aristotle argues again (independently of Argument *B.I*, which has taken up most of the chapter) that it is in any case reasonable, if not strictly necessary that there is an unmoved mover as a first mover (256b23–24, cf. b13–14), since (*a*) three things are necessary for movement, (1) what is moved, (2) the means used to move it and (3) what moves it (256b14–15); and (*b*) what is moved, i.e. (1), must be moved, but need not move anything (256b15–16); while (*c*) that by which something incites movement, i.e. (2), must both be moved and further incite movement (256b16–17), because (*c.i*) it changes with what is moved (256b17), since (*c.ii*) it is together in the same place with what is moved (256b17–18), as (*c.iii*) is clear in the case of things inciting locomotion (256b18–19), since (*c.iii.i*) what incites locomotion and what changes place must touch each other to an extent (256b19–20) – while (*d*) we see the last, (1) what can be moved but lacks a principle of causing movement (256b20–22); and (*e*) we see the second, (2) that by means of which something is moved (supplied), because (*e.i*) we see what is moved by itself (256b22–23); while (*e.ii*) the moved part of a self-mover is that by means of which it moves whatever external thing the self-mover also moves (supplied) – and (*f*) if two of these three, (1)–(2), are confirmed empirically, the third, (3), should also exist (supplied).

Commentary

The supplied Premisses *e* and *e.ii* follow Ross and the manuscripts generally at 256b22–23, here *e.i*, although Prantl's reading, perhaps supported by Simplicius (1227.10–12), and some manuscripts partially, would give us instead *e* explicitly, rather than *e.i*. Ross (p. 699) argues for his text claiming that the classification at 256b14–15, here (1)–(3) in *a*, is of parts played in a causal chain, whereas that at b20–24 (cf. here *d* to *f*) is of kinds of thing: those solely in movement, those in movement that originate movement (i.e., self-movers), and those that originate, but are not in, movement. This is reasonable, but the argument needs something corresponding to the moved mover by means of which

the unmoved moves the solely moved, and hence my supplied premisses. Seeck (p. 150) regards b20–24 as inconsistent with the analysis of a self-mover into an unmoved mover and moved part, and instead supporting a different hierarchy of causes, with an unanalysable self-mover subordinate to an external unmoved mover; thus he treats this passage as evidence the whole of 256b13–27 is a later insertion. On the general claim see the *Note* to 256b13–27 above (pp. 155–156), but the *Analysis* shows how the appeal to a self-mover here will fit into Aristotle's conception in Ch. 5 generally.

Simplicius (1227.13–24) explains the inference for which here *f* is supplied in two ways: first, the moved mover stands in the same ratio to what is moved as the unmoved mover does to it; second, that the moved mover is a mixture of what is moved and what moves, and if one ingredient exists independently, so should the other. He only implicitly distinguishes these in considering (1227.24–33) whether the latter might lead to a necessary conclusion, despite Aristotle's qualification, "it is reasonable, not to say necessary" (256b23), arguing that the principle is not always true, for instance in the case of consonants as elements of speech, which cannot be voiced apart from vowels, although the latter can be voiced independently. Themistius (223.1–6), the Arabic tradition and Aquinas (8.1044) offer only the latter reason for the inference (suggesting it is Alexander's).

Corcilius (pp. 268–269 with n. 29, cf. p. 302 with n. 27; cf. Alexander fr. 615 Rashed) regards this passage as corresponding exactly with the accounts of animal movement in *de An.* 3.10, 433b13–27 and *MA* 6, 700b35–701a6, where the object of desire is the unmoved mover, the desiring soul the moved mover, and the body what is moved.

Note

At 256b19–20, here *c.i.i.i.i*, where Aristotle says that in locomotion there is contact only "to an extent", Alexander (fr. 614 Rashed; cf. Simplicius 1227.5–9, Philoponus 832.28–30 = 885.20–23) suggests the qualification is because, in throwing, what throws loses contact before movement ends.

Ch. 5, 256b24–27: (C) Confirmation by Agreement with Anaxagoras

256b25

For this reason Anaxagoras speaks correctly in declaring intellect to be unaffected and unmixed, since in fact he makes it be the principle of movement. For only in this way could it incite movement while being unmoved and rule while being unmixed.

Analysis

Aristotle argues that Anaxagoras is right to declare the intellect to be unaffected and unmixed (256b24–25), since (a) the first mover must in fact be unmoved (256b24, “for this reason”); and (b) Anaxagoras regards intellect as the principle of movement (256b25–26), because, he presumably thinks, (b.i) only thus (i.e., by being an intellect) could the first mover incite movement while being unmoved, and rule while being unmixed (256b26–27).

Commentary

This is Anaxagoras DK A56. Simplicius (1227.33–40) and Aquinas (8.1045) regard it as another argument for the preceding point, that there is an unmoved mover, whereas Ross (p. 438) rightly indicates Anaxagoras’ conclusion, that intellect is unaffected and separate, is shown here to follow from the previous result. The *Analysis* above gives the structure of Aristotle’s rhetorical argumentation, but implicitly this suggests a more doctrinal argument that the first mover is an intellect (not stated, but cf. *Metaph.* 12.9), for two distinct reasons, firstly because (*I.a) the first mover is unmoved (256b24); and (*I.b) only intellect could incite movement while being unmoved (256b26–27) – and secondly because (*II.a) if, as Anaxagoras claims, the principle of movement must be unaffected and unmixed, he is right to identify it with intellect (256b24–25); but (*II.b) he is right (256b24–25), because (*II.b.i) the first mover must be unmoved, and rule while being unmixed (256b24, b26–27).

The Everlasting Causes of Movement

Introduction to Chapter 6

While Ch. 6 is formally organised to support the claim that there is an everlasting unmoved mover, the overall aim, as the culmination of the whole of Bk 8 to this point, is to answer the three questions alluded to at the beginning of Ch. 3 (253a22–32; see *Commentary* there, pp. 53–55), why some beings are moved only intermittently, how there can be everlasting movement and how animals can seem to move themselves (cf. similarly Waterlow, 1982, pp. 248–249). Ch. 5 has shown that the first mover in any causal series is unmoved, whether as separate from what it first moves, or the unmoved mover within a self-moving complex (an animal: see *Introduction* to Ch. 5, pp. 104–105 and cf. pp. 108–111).

Now in Ch. 6 Aristotle argues there must be an absolutely first unmoved mover of all movement in the cosmos, on three distinct grounds:

- (I) as the unique ultimate cause of generation of all self-movers (258b16–259a13);
- (II) as the cause of a single, continuous everlasting movement (259a13–20); and
- (III) since to explain how everything else alternates between movement and rest, there must be an everlastingly unmoved being, and in fact two everlastingly moved beings (259a20–260a19).

This final argument uses conclusions from previous chapters, supporting overall the cosmological-ontological doctrine that there are things of three kinds, (1) those everlastingly unmoved, (2) those everlastingly in movement, and (3) those that alternate between being moved and rest (see Ch. 3, 253a24–30, pp. 55–57). This triple claim, abstracting from the justification structure of the argumentation, summarises the explanatory outcome of the chapter as an account of the extent and causes of movement.

Waterlow (1982, p. 228 n. 13) claims there are just two arguments here: her *A* consists of (i) 258b26–259a6, and (ii) 259b32–260a19, in which she says *i* infers to an eternal changeless cause from the eternity of the sequence of finite changes, and *ii* infers from the former to an eternally moved body. But this yokes separate passages awkwardly. On the present analysis her *i* involves (*i*. α') the argument that nothing non-everlasting causes the continuous generation and

destruction of self-movers (258b26–259a3), along with (*i,β'*) the higher levels of Argument *I* here (259a3–6), to the claim that the environment is the cause of this, capturing key points in *I* here; but her *ii* is quite disconnected, forming part of the separate Argument *III* here (which she doesn't otherwise recognise), from previously established principles. The passage she specifies (259b32–260a19), on the first moved body, must clearly be taken with 259a29–b31, again establishing there is an absolutely unmoved first mover, so as together to justify Aristotle's answer (259a29) to the question whether alongside intermittently moved things there are also permanently moved and unmoved things. Waterlow's argument *B* is the same as *II* here (259a13–20), although she regards the inference from an everlasting movement to its mover as clearly elaborated at Ch. 10, 267a21–b6.

Waterlow raises difficult problems with Aristotle's inference to a first unmoved mover in Ch. 6. Following Cherniss (p. 583), she first argues (pp. 232–235; cf. 242–243) that Aristotle could justifiably treat the first body's rotation by analogy with terrestrial elemental natural movement in Ch. 4, yet since it needs no cause of generation or a remover of obstruction, it needs no distinct mover. Accordingly, she proposes two motives for Aristotle's distinction between the first mover and moved body, one theological, and the second that otherwise he could not interpret the first body's rotation as movement (pp. 248–251). Cherniss (pp. 582–583) notes that, on the definition of movement in *Ph.* 3.1–3 as the actuality of a potential, a potential presupposes an end, but owing to its continuity rotation has none (cf. Chs. 7–9); thus, Waterlow suggests, Aristotle substitutes subjection to a moving cause, *qua* source of actuality (cf. Ch. 5, 257b2–13), to justify treating rotation as movement: it is incomplete, and so movement, only by contrast with the unmoved mover's completeness. Waterlow (pp. 252–253) then notes a further problem. Again contrary to *Ph.* 3.1–3, whereby the mover transmits a form which becomes fully present in what is changed as a result of the process of change, in locomotion a moved mover transmits movement itself, so that locomotion should function as a complete attribute. Yet she notes that Aristotle must treat rotation as movement (and so incomplete), since his argument is that the general everlastingness of movement requires one single everlasting movement; thus she concludes he merely assumes that the distinction between being complete and incomplete coincides with that between being unmoved and moved. For a systematic attempt to respond to Waterlow, see Bodnár (1997). In summary he concedes the point that rotation does not fit the definition of movement for “terminating activity” (pp. 114–115), but argues, firstly, astronomical rotation counts as movement, not a complete activity, given the distinction in *Metaph.* 9.6 between these (p. 115), and, secondly, from the argument of *Ph.* 8.10 that a finite body (the rotating

sphere) could not contain the potential to cause an infinite movement, that it could not be autonomous (pp. 116–117); Aristotle thus has an independent physical reason for inferring there must be a prime mover.

Simplicius (1250.34–1251.25), who thinks Ch. 5 argues that any unmoved mover must belong to a self-moving whole, doesn't recognise a break before Ch. 6. He provides no introduction (cf. similarly Aquinas 8.1069), except by elaborating the distinction between the absolutely unmoved prime mover and an incidentally moved unmoved mover, an animal soul (see 258b14–16; cf. Philoponus 837.31–35). See also Wicksteed's Introductory Note, on the cosmological assumptions, preceding Cornford's regular chapter summary (1934, pp. 340–341).

Ch. 6, 258b10–16: The Everlasting First Mover, Introduction

6, 258b10

Since there must always be movement and it must not cease, there must be something everlasting that first incites movement, either one thing or many, and what first incites movement must be unmoved. The claim that each unmoved mover is everlasting is not relevant to the present account; yet, that there must exist what is itself unmoved, outside all change, both essentially and incidentally, but capable of inciting movement in something different, is clear if we consider it as follows.

b15

Analysis

In this passage Aristotle makes three distinct claims, (1) that there must be either one or several everlasting unmoved movers (258b10–12), since (1.a) movement in the cosmos is everlasting (258a10; cf. Chs. 1–2) – yet (2) it is irrelevant to the inquiry whether every unmoved mover is everlasting (258b12–13); but (3) there must be an essentially and incidentally unmoved external mover, outside all change (258b13–16), for reasons that follow (Arguments I–III).

Commentary

Claim 3 seems clearly to be a more precise repetition of 1, although the difference between them leaves open the question how many such everlasting movers there are, something Aristotle addresses partially below. Nevertheless there is no suggestion in *Physics* 8 of the doctrine of *Metaph.* 12.8 that astronomy can determine the particular number of heavenly spheres, each moved by its own everlasting unmoved mover; despite this the plurality of unmoved transcendent beings mentioned at *Cael.* 1.9, 279a18–23, whether Aristotle's later insertion or not, suggests the possibility that *Physics* Bk 8 was writ-

ten with awareness of a more cosmologically exact doctrine with which it was meant to be at least not inconsistent; cf. Wagner (p. 683, and p. 684 *ad* 259a7–8).

Simplicius (1250.36–1251.4) alone treats 258b10–11, here 1, as a separate argument inferring, from (1.a) the everlastingness of movement, and the assumptions (*1.b) that movement is in something moved, while (*1.c) something moved is moved by something, the conclusion that the first mover is everlasting. He thinks what follows is directed to proving that this first mover is absolutely unmoved (see 1251.4–25 on 258b11–16). By contrast, Aquinas (8.1069) treats 258b10–16 as a preliminary statement of position, subsequently proven. This seems more likely. The reference in 258b10, here 1.a, to everlasting movement, is to the result of Chs. 1–2, which Bk 8 as a whole has to explain. The conclusion that it requires an everlasting mover, rather than a series of finite movers sequentially maintaining movement, will take an argument. For the three distinct arguments taking up Ch. 6, and alternative views on the overall structure, see the *Introduction*, above (pp. 160–162).

Notes

On 258b12–13, here 2, where Aristotle recognises the question whether every unmoved mover is everlasting, Wicksteed (pp. 340–341 n. a) suggests he refers to the Platonic belief in the immortality of the soul, here considered as the unmoved mover of a living being. Seeck (pp. 145–146 n. 4) denies this, proposing it refers to Aristotle's own theory of multiple celestial movers, and since it does not contribute to the argument he suggests it might be a later insertion in the text (p. 146); but Aristotle's reference in b12 to "each of the unmoved movers" must also include the movers within self-movers, their souls, and they, not celestial movers, are the debatable case.

On 258b14–15, here 3, where Aristotle asserts that the everlasting mover is "outside all change" (πάσης ἐκτὸς μεταβολῆς), Ross (p. 704) observes he means outside even generation and destruction; cf. Alexander (frs. 652–653 Rashed) and Simplicius (1251.18–25).

Note on Ch. 6, 258b16–259a13: (I) Argument from the Cause of Generation

This major section of the text supports two primary claims. The first (1.1) is initially made in the introductory passage, that there is at least one everlasting unmoved mover, the numerically vaguer form of the claim (258b10–11, there 1),

since this vagueness extends to the form of the key premiss to follow (259a5–6), that “what surrounds” (ὃ περιέχει, a3–4) is the cause of the generation and destruction of self-movers whose unmoved movers are the cause of movement in other things. The second primary claim (*I.2*), responds to this obscurity by applying a principle of limitation, that we ought to assume there is just one such first everlasting unmoved mover (259a12–13). The argument for *I.1* takes up the majority of the passage, 258b16–259a8, and that for *I.2*, 259a8–13.

Aristotle first (*I.1.1*) concedes there are non-everlasting unmoved movers some might claim are sufficient to cause everlasting movement (258b16–22), then (*I.1.2*) argues that they nevertheless require a cause of their generation and destruction (258b22–26), and (*I.1.3*) excludes non-everlasting unmoved movers as the causes (258b26–259a3); from the conclusions of *I.1.1–3*, Aristotle infers that the cause is what surrounds, and from that concludes (*I.1*), that there is at least one everlasting unmoved mover. The relative vagueness of this conclusion, not merely numerically but also cosmologically, is a promissory note for the more detailed Arguments *II* and *III* following.

Ross (p. 705) paraphrases the argument of 258b22–259a6, essentially omitting only *I.1.1*, the concession of non-everlasting unmoved movers (258b16–22), on which see the *Commentary* below (p. 165).

Ch. 6, 258b16–22: (*I.1.1*) Admission of Non-everlasting Unmoved Movers

258b16 *Let it be possible in some cases, if someone wishes, for things to be at some time and not be <at another time> without generation or destruction (for perhaps, if anything without parts is at some time, and is not at another time, everything of this kind must be at one time and not be at another without change). And let it also be possible for some principles that are unmoved but capable of inciting movement to be at some time but not be at another.*

b20

Analysis

Aristotle here concedes some unmoved movers may be impermanent (258b20–22; cf. b12–13), because, although (*a*) unmoved movers don’t undergo generation and destruction (supplied), because (*a.i*) generation and destruction are movements (i.e. changes: supplied; cf. e.g. *Ph.* 3.1, 201a14–16) – nevertheless (*b*) some impermanent things do not undergo generation or destruction (258b16–18), since (*b.i*) nothing without parts can undergo change (258b19–20); but (*b.ii*) there are impermanent things without parts (258b18–19).

Commentary

Ross (p. 704) observes that in referring to the possibility of non-everlasting unmoved movers Aristotle has in mind individual souls (see the *Note* directly below on 258b19–20); thus if Wicksteed (pp. 340–341 n. *a*) is right that at 258b12–13 Aristotle alludes to the Platonic belief that all soul is immortal, he here concedes on the contrary that some souls may not be everlasting (cf. Alexander fr. 655 Rashed, implying this includes human souls). Simplicius (1251.13) reconciles Aristotle with Neoplatonism by proposing that this concession is merely tactical, since the study of the soul is a different subject, while Philoponus (837.36–838.9, cf. 887.7–12) states irrational souls are non-everlasting. Similarly Aquinas (8.1070, cf. 1073), no doubt with *de An.* 3.5 in mind, says that Aristotle concedes *b* at 258b16–18, despite believing the intellect is immortal, because other psychic parts cause movement, while if the whole soul is everlasting, the immortality of first movers would already be established.

Cornford (1934, p. 342 n. *a*; cf. Simplicius 1251.31–1252.3), explains these concessions as enabling an objection running, “there is no everlasting unmoved mover because, like animals’ souls, all unmoved movers, although not generated or destroyed, are nonetheless not everlasting”, which the following Argument 2 will block (258b22–26). In fact the concession is not only not incidental (whether or not *ad hominem*), but strategic, since it is presupposed by the central premiss of Argument 1 that an external cause is required for finite unmoved movers being and non-being at different times (258b22–26, Section *I.1.2* following).

Notes

On 258b16–18, here *b*, conceding that some things are and are not without change, see Graham (1999, p. 105) for instances in Aristotle, including sensations, some principles and causes, mathematical points (hypothetically), forms and essences. Alexander (fr. 654 Rashed) names movements and touchings.

Seeck (p. 146) suggests 258b18–20, here *b.i* and *b.ii*, is a later insertion, thinking it does not contribute to the argument, but this is contradicted by its role supporting b16–18 as shown in the *Analysis* (and note γάρ, b18).

At 258b19–20, here *b.i*, the claim that nothing without parts can undergo change, Cornford (1934, p. 342 n. *b*) and Ross (p. 704) refer to *Ph.* 6.4, 234b10–20: what changes must be divisible, cf. 6.10, 240b8–241a26. This implies Aristotle is thinking of an immaterial mover, such as a soul.

Ch. 6, 258b22–26: (I.1.2) Requirement for a Cause of Generation and Destruction

258b22 *Nevertheless, it is not at all possible for all of those* ⟨*sc. principles that are unmoved but capable of inciting movement, to be at some time but not be at another*⟩.¹ *For it is clear that things that move themselves have some cause of their being at some time and not at another time. For everything*
 b25 *that moves itself must have magnitude, if nothing without parts is moved, while there is no necessity from what has been stated that what incites movement has magnitude.*

Analysis

The initial statement (258b22) foreshadows the general conclusion of the argument for *I.1*, that there are one or more everlasting unmoved movers, completed subsequently at 259a8. In support, Aristotle here concludes that there is something that causes things that move themselves to be and not be at different times (258b23–24), since (*a*) everything moving itself must have magnitude (258b24–25), because (*a.i*) nothing without parts is moved (258b25); and (*a.ii*) what is divisible into parts has magnitude (supplied) – while (*b*) what has magnitude requires a cause of any change it undergoes (supplied); even though (*c*) the mover in what moves itself need not have magnitude (258b25–26).

Commentary

The argument shows that even if partless things, presumably including souls (see 258b16–22, above *I.1.1*), could be or not without a moving cause because they are not generated or destroyed, self-moving wholes require moving causes, since they must be generated and destroyed, having extended movable bodies and so parts.

Graham (1999, pp. 105–106) treats 258b20–26 as a self-contained argument for 258b22, the overall conclusion that there are one or more everlasting unmoved movers (see the *Analysis* above); his analysis includes a supposition [2] that unmoved movers that are or not at different times are themselves self-movers (cf. 258b23–24, but that refers to self-movers containing such unmoved movers; see below 259a4–6). Contrary to Graham's [2] it is clear that these self-movers are taken to have magnitude and so be generable (258b24–25, here *a*, overlooked in Graham's analysis), whereas their unmoved movers are taken

¹ See 258b20–22, immediately preceding.

as partless, without magnitude and ingenerable (258b18–20, numbered *a.ii* in Section *I.1.1* above). Simplicius (1252.12–13, 21–22) sees that 258b23–24 concerns self-movers containing unmoved movers that at different times are or not.

Seeck (pp. 152–153, cf. pp. 147 and 149) calls this argument a later insertion, because it comments on the assumption that some things may be immaterial (258b18–20 in Section *I.1.1* above), which he also considers an insertion (see *Note* there, p. 165), and because he thinks the present lines adopt a higher standpoint not integral to the overall argument and inconsistent with the concession at 258b20–22, in Section *I.1.1*: but the *Analysis* shows this is not so, since the finite immaterial unmoved mover Aristotle has in mind is the soul of an animal, which with its body forms a self-mover. Solmsen (1967 p. 15 n. 1; cf. p. 16) criticises Seeck here for artificially separating aspects of a question Aristotle does not, and because all the remarks here about immateriality are merely tentative.

Notes

Ross (p. 705) treats 258b25–26, here *c*, stating unmoved movers need not have magnitude, as a separate argument aiming to block off an infinite regress of causes behind the unmoved mover responsible for generation of self-movers, by excluding a cause of the being and non-being of their immaterial unmoved movers. Yet there would be at least an incidental cause of the latter, if they incidentally come into being when the self-mover containing each was generated (cf. 259a4–6, below). Here *c* is treated as an immaterial concession; Graham (1999, pp. 105–106) rightly complains it would be ineffective as actively supporting 258b23–24, but perhaps mistakenly thinks it is meant to (and see further discussion of his analysis in the *Commentary* above).

Ch. 6, 258b26–259a3: (*I.1.3*) Exclusion of Non-everlasting Movers as First Causes

For nothing unmoved that is not always there is responsible for things 258b26
being generated and others perishing and this ⟨process⟩ being continu-
ous, nor even, again, are these responsible for those, and different ones for 258b26
these. For neither is each of these, nor all of them, responsible for move-
ment being everlasting and continuous. For this status is ⟨itself some-
thing⟩ everlasting and of necessity, whereas these are all limitless and b30
not things that are all together ⟨at the same time⟩. Well then, it is clear
that, even though countless times over some unmoved movers, and many 259a1

things that move themselves, perish and others are generated in turn, and this unmoved being moves that thing and another moves this, [nevertheless there is something that surrounds them ...]

For the last clause (259a3), included here only for grammatical completeness, see the next section.

Analysis

The argument here concludes that no non-everlasting unmoved mover is the cause of the everlasting continuity of the generation and destruction of things, nor are some the cause of some things and others of others (258b26–29; cf. 258b32–259a3), on the basis that (a) neither any one of them individually, nor all collectively, are responsible for this (258b29–30; cf. b10), since (a.i) the cause of everlasting continuity must be necessarily everlasting (258b30–31); while (a.ii) *ex hypothesi* these unmoved movers are individually non-everlasting (supplied: see 258b20–22; cf. b12–13); and (a.iii) collectively they are not necessarily everlasting (supplied), because (a.iii.i) they are only contingently linked across time (supplied), since (a.iii.i.i) they are limitless and separated from one another (258b31–32).

Commentary

Graham (1999, pp. 106–107) allows that 258b26–259a6 supports the assertion that there is a prior (everlasting) cause of cosmic change (roughly the conclusion here), but claims it forms an independent argument, since the subject is now generation and destruction generally, not specifically self-movers any longer. But this distinction is false: at 259a6 (see next passage) self-movers or their unmoved movers are said to be the principle of change in other things too. Contrary to Graham, each passage contributes to a single overall argument, 258b22–26 (I.1.2, above) establishing the need for a cause of generation and destruction of self-movers, 258b26–259b3 (I.1.3, here) denying self-movers themselves are sufficient causes, and 259a3–6 (I.1.4, following) concluding that thus what surrounds them must be the cause. Seeck (pp. 152–153, cf. 149) also makes this mistake, arguing that the reference to self-movers at 259a1 is a later insertion, along with 258b12–13, b18–20 and b22–26, on which see the *Notes* above (pp. 163, 165 & 167).

Notes

At 258b28–29, in the conclusion, I translate Ross's correction οὐδ' αὖ τῶνδ' αὖ τῶνδ' αὖ τῶνδ' [κινουμένων], τούτων δ' ἕτερα, supported by the commentators, especially Philoponus (838.15–17). Wicksteed and Cornford print οὐδ' αὖ τῶν ἀεί μὲν ταδί

κινούντων, τῶν δ' ἕτερα, which is closer to the manuscripts (only τῶν for τούτων), translating “nor in any group of causes some of which produce motion in certain things and others in certain other things”. As Ross (pp. 705–706) notes, κινούντων implies that the genitives are partitive, paralleling the previous phrase, whereas he takes them as dependent on αἴτιον (b27, ‘responsible for’).

Translation and interpretation of 258b30–31, here *a.i.*, claiming the cause of everlastingness must be everlasting, follows Alexander (fr. 659 Rashed), Simplicius (1253.5–8) and Ross (p. 706), whereas Wicksteed, followed by Apostle and Graham take “this status” (τὸ ... οὕτως ἔχειν, 258b30) to refer to movement, not the attribute of being the cause of its everlasting continuity; but that is awkward and weak, since 258b10 has already stated again that movement must be everlasting. Graham (1999, p. 107) seems to think the sentence infers the necessity of cosmic movement from its everlastingness by the ‘principle of plenitude’ (that whatever is possible must eventually become actual), but that is difficult from just “everlasting and of necessity” (αἰδίων καὶ ἐξ ἀνάγκης, b31). Undoubtedly this is the reason Aristotle *would* have given for 258b30–31: that, if it were possible for the cause of everlasting continuity to cease to be, that would have to happen at some time, but then there would not be everlasting continuity; but it has been proven there is everlasting continuity, and thus it cannot be possible for the cause to cease to be.

At 258b31–32, here *a.iii.i.i.*, stating non-everlasting unmoved movers are limitless and dispersed, Simplicius (1252.35–40), followed by Waterlow (1982, pp. 224–225), apparently thinks the argument is that consequently they are not together, and so cannot act collectively, but Aquinas (8.1074) takes it as directly that one effect cannot depend upon limitless causes, and non-contemporaneous things cannot have the same effect, while Wicksteed (trans.), following Themistius (223.27–29, wrongly interpreted by Todd, trans. of Themistius, p. 146 n. 736), takes their limitlessness to imply that there is no first mover to begin the series. This might be the point if Aristotle thinks of them as each incidentally the product of the generation of the self-mover of which it is the soul (roughly thus Wicksteed, p. 344 n. *a*). Alternatively it might anticipate 259a8–9, asserting the limited is a preferable explanatory principle to the unlimited. Graham (1999, pp. 107–108), not referring to this premiss anywhere, thinks the argument that non-everlasting unmoved movers cannot collectively cause everlasting change rests on the principle that what is in the effect must be prior in the cause, but the text does not seem to appeal to that anywhere, and, as Graham admits, the species of self-movers containing such unmoved movers

are everlasting for Aristotle (GA 2.1, 731b24–732a1). Aristotle's point here is that some cosmic cause (the reliable activity of the sun, and what sustains that) is required to assure the everlastingness of the species, which is itself intrinsically contingent.

Ch. 6, 259a3–8: (I.1.4) What Surrounds, Conclusion to I.1

259a3

a5

... nevertheless there is something that surrounds them, and it is this, besides each thing, which is responsible for some things being and others not and for continuous change, and this is responsible for the movement of these things, and these for the movement of the rest. So, given that movement is everlasting, the first mover will also be everlasting, if there is one, and if there are more, there are more everlasting things.

Analysis

The passage concludes (I.1) that there is at least one everlasting unmoved mover (259a7–8, cf. 258b10–12), because (a) besides each self-mover and the unmoved mover it contains, something surrounds them all (259a3–4); while (b) what surrounds must be moved by one or more unmoved movers (supplied: cf. 259a6–8); and (c) what surrounds must be everlasting (supplied), because (c.i) what surrounds causes everlastingly continuous change (259a3–5), since (c.i.i) movement, including generation and destruction, is everlasting (259a6–7, cf. 258b10; proven *Ph.* 8.1–2); while (c.i.ii) what surrounds causes the being and non-being, and movement of self-movers (259a4–5, a5–6); and (c.i.iii) self-movers cause movement in other things (259a6).

Commentary

Here Aristotle implicitly draws a preliminary conclusion from Sub-arguments I.1.1 (conceding there are non-everlasting unmoved movers, 258b16–22), I.1.2 (establishing they require a cause of their own being and non-being, 258b22–26) and I.1.3 (excluding as causes non-everlasting unmoved movers, 258b26–259a3), that the cause is *what surrounds* all self-movers (259a5–6). This functions as Premiss c.i.ii in the present passage's argument. On the ultimate conclusion (I.1) that there is at least one everlasting unmoved mover (259a7–8, previously stated at 258b10–12) and overall reasoning see further Aristotle's introduction to the chapter, 258b10–16 (pp. 162–163) and the *Note on Ch. 6, 258b16–259a13: (I) Argument from the cause of generation* (pp. 163–164).

Zekl (p. 288 n. 93) glosses the conception of what surrounds as an original source or ground, but Aristotle seems rather to be thinking cosmologi-

cally, of the celestial environment (cf. Philoponus 838.23–26), where contemporary astronomy located rotating spheres carrying the planets, sun and moon. According to Aristotle these generate terrestrial movements, including reproduction, growth, sickness and death, primarily by the sun's heating and cooling produced in the alternation of day and night and the cycle of the seasons; cf. 259b15–16 with *Commentary* below (esp. p. 181), and also the *Notes* on 259b11 and b15–16 (pp. 184–185), and generally 259b32–260a19 (pp. 193–198).

Note

The interpretation of 259a5–6, here *c.i.ii–iii*, follows Simplicius (1253.30–1254.2), who also considers alternatively that 259a5–6 refers to the everlasting unmoved mover causing everlasting celestial movement, and the moved celestial bodies terrestrial movement; but on the view here he explains 259a6 as equivalent to the claim that, among moved things, self-movers are principles of movement (cf. Alexander fr. 662 Rashed, and see 259a33–b1 below, pp. 178–179). This is a common claim in Aristotle, but note, nevertheless, that it is not the case that self-movers (nor any non-everlasting unmoved movers) cause the movements of the elements (see Ch. 4, 255b13–256a3).

Ch. 6, 259a8–13: (I.2) The Principle of Limitation

But we ought to think there is one rather than more, and a limited number rather than unlimited. For if the same results follow, on each occasion we should rather assume what is limited. For in natural things what is limited and better ought rather to exist, if it is possible. And in fact one is sufficient, which, as the first unmoved thing, being everlasting, will be the principle of movement for the rest of things. 259a8 a10

Introductory Note

This passage establishes Premiss *I.2*, that, assuming we infer there are everlasting unmoved movers (for which see *I.1*), we should think that there is just one; then the conclusion of Argument *I*, that there is one everlasting unmoved mover, immediately follows (259a12–13). For the place of Argument *I* in the chapter see the chapter's *Introduction* (pp. 160–161), and the *Commentary* in Ch. 6, 258b10–16: *the everlasting first mover, introduction* (pp. 162–163), and for the structure of Argument *I* see the *Note on Ch. 6, 258b16–259a13: (I) Argument from the cause of generation* (pp. 163–164).

Analysis

Aristotle concludes (*I.2*) that we should think there is just one first unmoved principle (cf. 258a12–13), because (*a*) we ought to think there is one rather than many, and a limited number rather than an unlimited (259a8–9), because (*a.i*) on each occasion, if the same results follow, we should assume what is limited (259a9–10), since (*a.i.i*) in natural things what is limited and better ought rather to exist, if it is possible (259a10–12); while (*a.ii*) one first unmoved everlasting principle accounts adequately for the everlastingness of movement (259a12).

Commentary

In the previous passage, following the conclusion (*I.1*) that there is a first everlasting mover (259a7), Aristotle adds, “if there is one, and if there are more, there are more everlasting things” (a7–8), confirming the result of 258b26–259a3 (Sub-argument *I.1.3* above), that a plurality of non-everlasting movers cannot cause everlasting movement. Following Alexander (cf. fr. 663 Rashed), Simplicius (1254.7–9) understands the protases at a7–8 to refer to one or more moved bodies, but this is unlikely linguistically. Now Aristotle corrects the *ad hominem* admission that there might be more than one first mover. Ross (p. 706) compares *Ph.* 1.4, 188a17–18 and 1.6, 189a14–16 for the antecedent of Occam’s razor expressed at 259a8–10, here *a* and *a.i*, although as Graham (1999, p. 108) notes, the motive is not epistemic economy, but commitment to natural teleology, as 259a10–12, here *a.i.i*, makes clear.

Apostle (p. 324 n. 15), assuming consistency with the doctrine of multiple unmoved movers of the spheres in *Metaph.* 12.8, suggests Aristotle means just that one of the everlasting unmoved movers is somehow prior (perhaps as the mover of the first sphere containing the fixed stars, whereas the others are movers of planetary spheres). Graham (1999, p. 108), despite admitting this possibility, supports Ross’s view (pp. 101–102) that these passages are unproblematic if *Ph.* 8 was written before *Metaph.* 12.8, contrary to Jaeger’s suspicion that both 258b11 and 259a7–12 are later insertions. Seeck (p. 130) argues against Jaeger that the possibility of plural movers refers not to the theory of *Metaph.* 12.8 but individually contemporaneous and everlasting movers (such as everlasting souls of individual living beings, perhaps reincarnated; cf. b30–32), correcting the rejected possibility of a limitless sequence of impermanent unmoved movers in Argument *I.1.3* above (258b26–259a3); but that is unparalleled and implausible.

Notes

Aquinas (8.1075) thinks 259a8–9, here *a*, forms an argument, apparently by analogy, or perhaps *a fortiori*, that we ought to think there is one first principle

rather than many because we ought to think there is a limited rather than an unlimited number of them.

Simplicius (1254.15–20) and Aquinas (8.1075) both elaborate 259a10–12, here *a.i.i.*, and the justification it provides as follows: in natural things what is limited should exist because what is limited is better and what is better should exist, because nature is ordered in the best way, but as McKirahan (trans. of Simplicius, p. 160 n. 44) notes, this reason is not given in the text here, although he compares *Cael.* 2.5, 288a2–3, *PA* 4.10, 687a16–17; cf. similarly with further refs. Lang (1998, p. 3 n. 1, and p. 8 with ns. 15–16). Cornford (1934, p. 344 n. *b*) compares *Ph.* 8.7, 260b21–24, where the continuous is considered better than the sequential, if it is possible.

Ch. 6, 259a13–20: (II) Argument from the Unity of Everlasting Movement

This is the second of three arguments for an everlasting unmoved mover in Ch. 6. For the overall structure of the chapter see the *Introduction* (pp. 160–161).

It is also evident from the following that what first incites movement must be one everlasting thing. For it has been demonstrated that there must always be movement. And if it must be always, it must be continuous. For actually what is always must be continuous, whereas what is sequential is not continuous. But in fact if it is indeed continuous, it is one. And one movement is that incited by one mover and of one moved thing. For if now one thing and now another thing incite movement, the whole movement will not be continuous, but sequential.

Analysis

Aristotle argues here that the first mover is one and everlasting (259a14–15), because (a) there is one everlasting movement (259a17–18), since (a.i) it has been proven that movement is everlasting (259a15; cf. 258b10: see *Ph.* 8.1–2); while (a.ii) if movement is everlasting, it is continuous (259a16), since (a.ii.i) what is everlasting is continuous and what is sequential is not continuous (259a16–17; cf. *Ph.* 5.3, 226b34–227a6) – and (a.iii) if movement is continuous, it is one (259a17–18; cf. *Ph.* 5.4, 228a22) – but (b) one movement is the result of one mover and one moved body (259a18–19; cf. *Ph.* 5.1, 224a34–b1, 5.4, 227b29–33, 7.1, 242a69–b42), because (b.i) if there are different movers the whole movement will not be continuous but sequential (259a19–20).

Commentary

Simplicius (1255.34–1256.30) notes that in *Ph.* 8.1 Aristotle argued that movement is everlasting from the necessary inexhaustibility of the sequences of finite movements between endpoints, whereas now he infers from that result that since everlasting movement requires continuity, not merely sequentiality, there must be a single everlasting movement of a single body underlying the sequentiality of all other movements, and so a single everlasting mover. Apostle (pp. 324–325 n. 16) overlooks this, since he thinks Aristotle needs to either hypothesize or derive from observation that there is one everlasting continuous movement. The summary by Themistius (224.2–5) is garbled, ignoring the importance of the premiss that the everlasting movement is one (259a17–18, here *a.iii*). Aquinas (8.1076) seems mistaken in two ways, asserting that the motivation here is that someone might think a self-mover containing a series of diverse non-everlasting unmoved movers causes the first movement. Rather, Aristotle first here shows that there is a single movement, and he does not refer to the possibility of an everlasting self-mover.

Zekl (p. 288 n. 98) apparently thinks Aristotle argues here that the whole world-process is one, rather than that it depends upon one particular everlasting movement; consequently Zekl claims this argument contradicts *Ph.* 6.10, 241b18–20 (asserting that the only movement that is one and everlasting is rotation: cf. *Ph.* 8.8–9). But we should rather take that result as a control on our interpretation of what Aristotle means here; cf. Kukkonen (pp. 324–334), arguing that Aristotle does not typically treat the world (*cosmos*) as a unity. Solmsen (1960, p. 226 n. 13) claims the proof of a distinct single everlasting movement is incidental to the argument's aim, asserting this is the only place it is argued for, before being assumed in Ch. 7. That is incorrect, since 259b32–260a19 below, Argument *III.2*, demonstrates that there is a first everlastingly moved body (inferring the first mover must move one, and that both are required to sustain everlasting generation and destruction).

Waterlow (1982, p. 228 n. 13) asserts that the present argument's inference from moved body to mover is elaborated in Ch. 10, 267a21–b6, on which see the *Commentary* (pp. 344–345, and cf. *Notes*, p. 348); cf. Solmsen (1961, p. 275 with n. 20), denying each argument has the same conclusion. Actually both conclude, at a similar level of argumentative subordination, from the continuity and so unity of movement to its mover's unity (259a14–20 vis-à-vis 267a22–24), and in both this supports the further conclusion that this mover is everlastingly unmoved (258b13–16, vis-à-vis 267b4–5). That is the ultimate conclusion in the present chapter, but see the *Note* on Ch. 10, 267a21–b17 (pp. 342–343) for the function of the passage there, supporting the further argument that the first movement is uniform (267b6), and thus is that of the sphere of the fixed stars.

Graham's analysis (1999, p. 109) of the present argument leaves out the step from continuity to unity of movement at 259a17–18, here *a.iii*. As a result he understands 'continuous' (συνεχές) in 259a16–17, here *a.ii* and *a.ii.i*, as synonymous with 'everlasting' (as apparently at 258b27, b29, and 259a5), not in the stronger sense implying the movement's unity (although Graham notes continuity and unity are equivalent at *Ph.* 5.4, 228a22). Consequently he wrongly calls the implication that cosmic movement is continuous 'trivial', apparently overlooking the argument's cosmological hinge, Aristotle's deduction that there must be one single everlasting movement, and thus one moved body and mover (259a17–19, here *a* and *b*).

Notes

In 259a16–17, here *a.ii.i*, the contribution to the argument of the additional point that the sequential is not continuous is not obvious. Simplicius (1256.1–3, cf. 1255.7–8) and Philoponus (838.28–33 = 888.5–11) each independently attempt to give it a distinct role, but Simplicius' version is implausible, and Philoponus' obscure. It could also be a gesture towards a second argument directly for the unity of everlasting movement, but is probably best treated as here as merely an elaboration of the strong sense of continuity Aristotle intends.

In the *Analysis* for 259a18–19, here *b*, the claim that one movement is the result of one mover and one moved body, the references given from *Ph.* 5 and 7 do not explicitly assert the one-to-one correspondence of a movement with its cause. Philoponus (888.12–16) argues that, if either mover or moved subject changes, the movement is only sequential. *Ph.* 3.3 implies this principle, arguing that the actuality of the mover as such is in the movement (since otherwise a mover might have two distinct actualities), and *Metaph.* 12.8, 1073b26–38 appeals to it. Wagner (p. 684) overlooks this, and Graham (1999, pp. 109–110) challenges it with the example of a projectile, thinking Aristotle would have to admit this was moved both by what is responsible for its forward movement, and also by what causes it to end up on the ground. Yet Aristotle would probably claim there were two distinct movements at once (as for celestial bodies on the Eudoxan model).

Ch. 6, 259a20–29: (III) Argument from Previously Established Principles, Introduction

Argument *III* for an everlasting unmoved mover takes up the rest of the chapter. For the general structure of Ch. 6, see the *Introduction* (pp. 160–161). This

argument answers the question first raised in Ch. 3, whether along with things that are moved and at rest alternately, there are also things everlastingly in movement and things everlastingly at rest (unmoved).

259a20

Well, from this one could be assured that there is something unmoved first, and again by taking a look at the principles.² It is evident that some beings are sometimes moved and at other times at rest. And through this it has become clear that neither is everything in movement nor everything at rest nor some things always at rest and others always in movement, for those that alternate and have the power of being moved and of resting demonstrate the truth about this. Since things of this kind are clear to all, and we wish to demonstrate the nature of each of the other two, that some things are always unmoved and others always in movement, ...

a25

Analysis

After a comment on the implication of Argument *II* (see the previous passage), Aristotle announces another proof of the everlasting unmoved mover. The support is formulated in terms answering the question from Ch. 3, (*a*) that not everything is always at rest, or always in movement, nor are some things always at rest and all others always in movement (259a24–25; cf. 260a12–13, proven *Ph.* 8.3), since (*a.i*) there are things that alternate between movement and rest, with the potential for each (259a22–23, 25–27; cf. 260a13–14) – while (*b*) there are also things that are always unmoved and things that are always in movement (259a29). Aristotle continues now by supporting *b* with an argument (*III.1*) for an absolutely unmoved first mover (259a29–b31), and another coordinately (*III.2*) for one first everlastingly moved body (259b32–260a19).

Commentary

The title in the heading above follows Ross's excision (cf. p. 706) at 259a22 of τῶν κινούντων ("of the things that incite movement") after τὰς ἀρχάς ("the principles"), the latter taken as referring to the argument's principles from Ch. 3 onwards (cf. Ch. 3, 253a22, 254a16–18, Ch. 6, 260a11, cited by Wagner, p. 684). As Graham (1999, p. 110) notes, 259a22–b1 recapitulates sequentially the arguments of Ch. 3 (here at 259a22–27), Ch. 4 (at 259a30–31) and Ch. 5 (in 259a30–b1 generally). Additionally, 259b1–16 and b22–26 confirm the result

² Following the text of Ross (cf. p. 706); see *Commentary*.

of Chs. 1–2, and 259b1–16 clarifies, as there promised, the denial in Ch. 2 that animal movement has an absolute beginning in time.

Themistius (224.7–8) and Simplicius (1256.34–36), by contrast (and cf. Alexander fr. 666 Rashed), think the expression “principles of the things that incite movement” (259a22) means the souls of animals (cf. *Ph.* 8.7, 261a25–26), and that the sentence containing it announces the account of animal movement; as a result Simplicius (1257.9–10) considers the preceding summary of previous chapters’ results a diversion and Themistius just skips it (224.8, with Todd, trans. of Themistius, p. 146 n. 739). Solmsen (1971, p. 181 n. 31; cf. Philoponus 888.17–889.2 and Apostle, p. 325 n. 17), defends the received text against Ross, on the grounds that the whole of what follows in Ch. 6 discusses “the principles of the movers” in the question which kind of mover is first (one absolutely unmoved, rather than soul, *contra* Plato), and which second (the first moved body), and so forth.

Seeck (p. 132) argues that the recapitulation in 259a20–b1 is a later insertion in the text since its introduction is incoherent; ignoring the fact that a20–21 announces another proof specifically of a *first* unmoved mover, he claims this cannot imply a reference back to a previous such proof earlier in Ch. 6, thinking there is no proof there that the first mover is unmoved, while it cannot refer instead to Ch. 5, since the present passage is merely a recapitulation of that, not another proof. As Solmsen (1967, p. 17) points out, what is new in the proof Aristotle announces at a20–21 does not come until after the recapitulation which introduces it (cf. esp. 259b16–260a19). Seeck (pp. 142–143) claims confirmation that this passage is a later insertion from the categorisation of things as always moved, always unmoved or alternating between these states (259a22–29), since he argues (pp. 135–142) that references to this are later additions, incoherent with the original project in Chs. 3–6 of explaining the cause of alternating movement and rest (see the *Commentary* on Ch. 3); yet actually 259a33–b1 refers to self-movers and unmoved movers as causes, leading directly into the causal account of animal movement (259b1–16), so these two aims cannot be distinguished, or passages separated.

Note on Ch. 6, 259a29–b31: (*III.1*) The Argument for an Unmoved First Mover

At 259b23–24 (cf. 260a17–18) Aristotle asserts the conclusion of Argument *III.1*, that there must be a first mover unmoved even incidentally. Several of the immediate premisses for that (259b22–28, below *III.1.4*), are first supported by a series of preparatory arguments, to be treated here separately,

- (*III.1.1*) that a first mover is unmoved (259a29–b1, summarising from Ch. 5);
 (*III.1.2*) that self-movers do not initiate movement completely independently
 (259b1–16, elaborating Ch. 2, 253a7–20); and
 (*III.1.3*) that incidentally moved unmoved movers cannot cause continuous
 movement (259b16–22 and b28–31).

See the *Commentary* (esp. p. 188) below regarding the connection of 259b28–31 to b16–22, here in *III.1.3*.

Solmsen (1971, pp. 181–182), regards 259b1–28, or even to b31 (see p. 182 n. 35; cf. his 1967, p. 17), here *III.1.2–4*, as an interruption of the chapter's argument, in which Aristotle refutes the Platonic theory of cosmic soul, notwithstanding the heightened language of 259b24–26, suited to his own conclusion. Yet that Aristotle intends another proof of the nature of the first mover here is shown by the summary of earlier premisses at 259a30–32 in *III.1.1*, and the linguistic connection in b1–7, here *III.1.2*, with what immediately precedes: see *τιαυτα* (“things of this kind”, b2), referring to *δ αὐτὸ ἐαυτὸ κινεῖ* (“what moves itself”, a33–b1) in *III.1.1*. Moreover, as this *Analysis* shows, a33–b1 is inadequate alone to establish that the first unmoved principle is not moved even incidentally, and thus the everlasting cause of everlasting movement, which is what *III.1.2–4* contribute; note also the anticlimactic effect of the apodosis *προήλθομεν ... ἀκίνητον* (“we proceeded ... unmoved”, a32–b1) without what follows, since alone it merely summarises the result of Ch. 5, not even stating the result of Ch. 6, that there is a cosmic first unmoved mover (see 259b23–24).

Ch. 6, 259a30–b1: (*III.1.1*) The Causal Priority of an Unmoved Mover

- 259a30 ... and by proceeding to this point, and establishing that everything in
 movement is moved by something, and that this is either unmoved or in
 movement, and if it is moved, either by itself or in each case by something
 else, we proceeded to the assumption that a principle of things in move-
 259b1 ment that is itself among things in movement is what moves itself, but
 among all things it is what is unmoved, ...

Introductory Note

The sentence containing this passage begins in the previous passage (259a20–29: *Argument III, Introduction*, p. 176) at 259a27 (“Since ...”), and the present passage continues the original subordinate clause; the following passage (*III.1.2*) will continue the subordinate clause (“and ⟨since⟩ actually ...”, 259b1), and only

reaches a main clause in b6 (“... we must now establish this ...”). Thus the present passage is all a summary of what was previously established and is now assumed as preliminary to addressing the following passage’s question about the explanation of animal self-movement; the immediate conclusion then also supports the key premiss in *III.1.4* that everlasting movement depends on a first unmoved principle (259b27).

Analysis

This argument concludes that, although among moved things what moves itself is a principle of what is moved, what is unmoved is a principle of everything that is moved (259a33–b1; proven *Ph.* 8.5), since (a) everything moved is moved by something (259a30–31; proven *Ph.* 8.4); while (b) what moves something is either itself moved or unmoved (259a31); and (c) a moved mover is either moved by something else or by itself (259a31–32); but (d) a mover moved by something else is ultimately moved by a first mover (supplied: cf. *Ph.* 8.5, 256a10–16); and (e) a self-mover is moved by a part which is an unmoved mover (supplied: cf. *Ph.* 8.5, 256b13–24, 257a31–258b4).

Notes

The wording of 259a33, here in the conclusion, follows the interpretation of τῶν κινουμένων ἐστὶν ἀρχὴ κινουμένων (“a principle of things in movement that is itself among things in movement”) by all modern scholars following Wicksteed (p. 348 ns. 1 and a) and Simplicius; cf. Solmsen (1971, p. 180 n. 29). This does not imply that what moves itself is involved in all causal chains, only some. Self-movers would not produce meteorological and other elemental movements. On passages in *MA* thought by some scholars, to imply otherwise, see Blyth (2015, Ahead of Print pp. 10–14). Seeck (p. 150) claims that the hierarchy implied contradicts the analysis of self-movers into unmoved movers and moved bodies in Ch. 5, and so this statement, along with all of 259a20–b1 (on which see the *Commentary* above, esp. p. 177), is a later insertion; but as understood here there is no inconsistency.

For **Premiss d**, supplied here, that a mover moved by something else is ultimately moved by a first mover, cf. similarly Aquinas (8.1079) and Simplicius (1257.27–28). Note it is unnecessary to specify additionally that the first mover must be either unmoved or self-moved, given 259a31–32, here *b* and *c*.

Ch. 6, 259b1–16: (*III.1.2*) Continuity of Movement Despite Animal Self-movement

259b1 ... and (since) actually we see that there are evidently things of this kind,
 that move themselves, such as the class of ensouled beings and that of ani-
 mals, and these in fact gave the impression that perhaps movement is able
 b5 to be engendered not having been at all, because we see this happening in
 these things (for having at one time been unmoved, at another they are in
 movement, as it seems), we must now establish this, that they move them-
 selves with one movement, and not independently. For what is responsible
 is not innate, but rather animals have other natural movements within
 them, with which they are moved through themselves, such as growth,
 b10 shrinking and breathing, with which each animal is moved when at rest
 and not being moved with the movement with which it is moved by itself.
 What is responsible for this is the surroundings and the many things
 that enter it, as the food (is responsible) for some (movements).³ For when
 it is being digested, they sleep, and when it is being distributed (around
 the body) they wake up and move themselves, while the first principle
 is outside, because of which they are not always moved continuously
 b15 by themselves. For what incites movement is something else, itself in
 movement and changing in relation to each of the things that move
 themselves.

Introductory Note

The conclusion of Argument *III.1.2* supports the premiss in *III.1.4* below, that movement in the cosmos is everlastingly continuous (259b22–23, b24–26; cf. *Ph.* 8.1) by rejecting the apparent counterexample of animal self-movement; cf. similarly Simplicius (1259.3–7), and otherwise Philoponus (838.36 = 889.33, cf. 891.15–18), calling it a digression. In Ch. 2 Aristotle faced as the third of three objections to the everlastingness of movement, that animals as self-movers seem to show movement can begin from nothing, so that it need not be continuous (stated, *Ph.* 8.2, 252b17–28, 253a7–11; there answered, 253a11–21). Aristotle here re-states this problem and gives an only slightly fuller explanation.

Analysis

Aristotle states the problem (*ι*) that self-movers seem to show that movement can begin having not previously occurred (259b3–4), since (*1.a*) we see that

3 Following Ross (p. 707).

animals move themselves (259b1–3); and (1.b) they seem to begin moving themselves having previously been unmoved (259b4–6).

His answer here is (2) that in fact self-movers move themselves with only one movement (locomotion), and not completely independently (259b6–7; cf. *Ph.* 8.2, 253a14–15), since (2.a) the cause of animals not always moving themselves continuously is external to the animals themselves (259b7–8, b13–15), because (2.a.i) animals undergo other movements even when not in locomotion, such as growth and shrinkage, and breathing (259b8–11; cf. *Ph.* 8.2, 253a11–12); and (2.a.ii) the surroundings and what enters them from it, such as food, is the cause of these other movements (259b11–12; cf. *Ph.* 8.2, 253a12–13), because (2.a.ii.i) they sleep while digesting it, and awaken and move themselves when it is distributed about the body (259b12–13; cf. *Ph.* 8.2, 253a15–20) – while (2.a.iii) the cause in the surroundings is itself moved and changes in relation to individual self-movers (259b15–16).

Commentary

Premiss 2.a.iii (259b15–16) explains the variability of animal rest and movement; possibly this refers to the changing availability of food, but ultimately the cause of all relevant environmental changes is the movement of the sun, producing night and day and the seasons.

Graham (1999, pp. 110–111) notes, with references, that for Aristotle self-movement does not define animals: rather perception does, some animals lacking self-movement. Nevertheless Aristotle clearly assumes here *only* animals display self-movement: see further 259b16–22, b28–31, here *III.1.3*, with *Commentary* below (pp. 185–188), Ch. 4, 255a5–18 (pp. 87–90), the *Introduction* to Ch. 5 (esp. p. 104), and there the *Note on Ch. 5*, 256a13–b24 & 256b27–258b9: (B) *unmoved first movers*, toward the end (esp. pp. 110–111), and cf. Blyth (2015).

For convenience, justification of the break at 259b16 is presented in the *Commentary* under Ch. 6, 259b16–22, b28–31 (*excluding* b22–28): (*III.1.3*) *incidentally moved movers*, below (pp. 186–188). Graham (1999, p. 112), who thinks 259b1–20 is a single argument, offers a “possible representation”, concluding (his [5]) that animals do not properly move themselves (representing 259b6–7, here 2); he thinks this is meant to follow from his [4], that animal self-movement is not continuous (despite the fact that he admits he cannot see how), and that his [4] follows from the preceding stages of the argument of the passage. But that animal self-movement is not continuous is not a conclusion, but the datum of immediate evidence to be explained (see 259b4–6, here 1.b). The primary reason for the non-independence of animal self-movement (259b7–8, b13–14, b15, here 2.a), is rather that the internal changes initiating locomotion have an external origin (roughly, Graham’s [2]). Again, Graham’s inference to the lat-

ter from his [1], that the surroundings cause internal movements (259b11–12, here 2.a.ii), is not helped by his distinction between involuntary and voluntary movements: Aristotle does not say that the animal itself makes no contribution, and his point is just that it does not act *κυρίως* (*kuriōs*, 259b7), here interpreted as “not completely independently” (see the *Note* below, p. 184). On Graham’s alternative suggestion (1999, pp. 115–118) regarding the argument’s structure see the *Commentary* on Argument *III.1.3* (259b16–22, b28–31; p. 187) below.

Morison (pp. 72–77) also holds the view that the argument continues to 259b20, but he explains b1–16 quite differently. He identifies the two primary claims at 259b6–8, as that animal self-movement is restricted to locomotion (his [a], here 2), and that even so their locomotion is not self-movement strictly speaking, because the cause is not from the animal itself (b7, his [b], here 2.a); then Morison (cf. similarly Nussbaum, p. 119), argues that what follows immediately regarding non-locomotive animal changes (258b8–16) does not justify his [b] (contrast here 2.a and support), but rather explicates his [a], the restriction to locomotion. In order to defend this he replaces the comma after αἴτιον (b8) with a full stop (following Nussbaum), so other animal movements, referred to immediately thereafter, would not be subject to the explanatory γάρ (‘for’) at b7. He claims the point in b8–16 is then that, by contrast with locomotion, these other changes are continuous. Thus Morison re-interprets b14–15 not as re-asserting the conclusion that animal locomotion is not entirely autonomous (here 2), but as claiming that their continuous movements are not self-movement (as is also implied by Nussbaum). Yet word order is strongly against this (ὅφ’ αὐτῶν ought then to follow the negative immediately; cf. Solmsen, 1971, p. 175). Moreover b15–16, here 2.a.iii, concerning changes in the external cause in the environment, is most naturally taken as explaining why, as its indirect effect, animal self-movement is non-continuous (surely referring to the sun, by whose presence and absence animal sleep and eating patterns are regulated: see *Note* below, pp. 184–185). Morison’s interpretation of the initial reason in his [b] above (259b7–8; contrast here 2.a), that animal locomotion is not self-movement strictly speaking “because the cause is not from the animal itself” (οὐ γάρ ἐξ αὐτοῦ, b7), is that this means that the cause is not the whole animal, but only the self-mover within, i.e., its soul (but parallels suggest ἐξ αὐτοῦ [*sc.* γενόμενον] means here ‘innate’). On the rejected interpretation of *κυρίως* (*kuriōs*) as ‘strictly speaking’ see the *Note* below on 259b7 (p. 184), and on Morison’s interpretation of b16–20 as pursuing implications of the soul causing locomotion, see below, *Commentary* on Argument *III.1.3*, 259b16–22 and b28–31 (p. 187).

Nussbaum (pp. 119–120) differs from Morison only by interpreting the attributed claim that the animal itself does not cause self-movement (259b7–8) as

implying the object of desire does; she treats the claim that the first principle of movement is external (b13–14) accordingly as about self-movement (mentioned immediately previously), not digestion causing awakening (b11–13); but the statement “the cause of this (of lack of self-movement, during sleep) is the environment and many of the things that enter the animal” (b11) shows that b13–15 (cf. also b7–8) refers to environmental influences causing non-continuity of locomotion. Gill (1989, pp. 209–210 with n. 68) treats the claim self-movement depends on environmental conditions as evidence that an unmoved mover does not initiate movement, but rather only sustains it.

This passage has been topical since Furley (1994/1978), following Nussbaum, rehabilitated the notion that for Aristotle animals really are self-moving (see esp. 259b1–2, b17–18), contrary to medieval interpretation, for which see King (pp. 227–228 and 236–238) and earlier modern scholars, such as Solmsen (1971, pp. 175–176 and 180), Seeck and Guthrie (pp. xxiv, xxix and 351 n. a, misreferring τούτων in both *Cael.* 4.3, 311a13 and *Ph.* 8.4, 255b29); cf. Furley (1994/1978, pp. 6–7 ns. 5–6). Sorabji (1980, p. 229) answers Furley claiming, given an animal is here said to be not a self-mover *κυρίως* (understanding *kuriōs* as “not strictly speaking”, following Furley, 1994/1978, p. 6, and Nussbaum, p. 119), that Aristotle calls animals self-movers as a concession to popular usage, citing *Ph.* 8.2, 253a14; yet on the term *kuriōs* see the *Note* below on 259b7 (p. 184). Sorabji’s later claims (1988, pp. 222 and 246) are more moderate.

Contributions in Part I of Gill and Lennox (eds., 1994) support genuine self-movement in Aristotle; among these Meyer (p. 70) elaborates Furley’s explanation that causation by an object of desire is consistent with both (i) animals being self-movers, since the object’s appearance depends on the animal’s history and condition (Furley, 1994/1978, pp. 8–14), and (ii) the dependence of animal desire on being awoken, which does not determine the form desire takes. Freeland (pp. 51–52, 54), Judson (1994, p. 162) and other contributors emphasise, against Furley and Gill (1994), that a self-mover’s unmoved mover is an efficient cause. Subsequently Berryman (pp. 86–93) provides summary and analysis of such treatments, criticising Gill (1994) and Meyer for failing to explain why terrestrial self-movement in Aristotle is restricted to animals, and Waterlow and Furley (1994/1978) for not explaining why self-movement is restricted to locomotion; she answers that, since locomotion is normally primary in a causal chain (*Ph.* 8.7), self-movers are exceptional in responding to alterations with locomotion (but compare the elements). Aquinas (8.1080) states locomotion is the only animal self-movement because this is the only movement directly subject to appetite.

Notes

The quasi-political interpretation of *κυρίως* (*kuriōs*, 259b7, here in 2) as ‘independently’ (with complete autonomy, subject to no further conditions), follows from the context (see b7–8: “what is responsible is not innate”). On the term see Apostle (p. 325 n. 22), and Morison (pp. 73–74), who assumes the sense ‘strictly speaking’ (Bonitz s.v. 416a61 ff.), and associates it with other terms used in that sense to justify his interpretation of 259b7–8, on which see above. But then does Aristotle here say animals are self-moving only in some respect (see 2), or not really at all, ‘strictly speaking’? This latter sense is adopted also by Furley (1994/1978), and so by all commentators in Gill and Lennox (eds., 1994) without comment, although this is very relevant to their conception of the problem. (See further the *Commentary* above).

At 259b8, introducing 2.a.i, ἀλλ(ά) (‘but’) is apparently used not merely adversatively, but introducing the reason for a denial (cf. Denniston s.v. 3.i, p. 7): note the negative in b7–8, here 2.a, and cf. γάρ introducing the same claim, following the same denial, at *Ph.* 8.2, 253a11.

On 259b11, here 2.a.ii, Ross (p. 707; cf. Graham, 1999, p. 111) suggests by “the surroundings” (τὸ περιέχον) Aristotle means primarily the atmosphere, as materially responsible for breathing; but Aristotle mentions food, implying he means the environment generally; cf. 259a3–5 above, where he calls what surrounds the cause of continual change, suggesting there at least he means the literally encircling spheres of the heavens. Aquinas (8.1080) offers two possibilities: the heavens and air affect animals directly, or air and food enters the body and influences it.

On 259b12–13, here 2.a.ii.i, Simplicius (1258.20–30), Philoponus (890.11–22) and Graham (1999, p. 111), with references, summarise Aristotle’s physiology of sleep from *De somno* 3. Todd (trans. of Themistius, p. 146 n. 743) notes both Themistius and Simplicius interpret Aristotle’s present participle (“while being distributed”: διακρινομένης, 259b13) as implying awakening after the distribution of food in accordance with *De somno* (cf. similarly Philoponus 890.17–19); did Aristotle perhaps write διακεκριμένης?

On 259b15–16, here 2.a.iii, Graham (1999, p. 111) following the commentators regards the cause in the surroundings as physical. Alexander (ap. Philoponus 891.1–9), cf. Al. (fr. 681 Rashed) and Simplicius (1258.32–35), identifies “the rotating body” as affecting self-movers by its everlasting movement. Philoponus (890.32–34) himself proposes air; perhaps rather Aristotle means the sun, as

cause of growth of food, day and night, and atmospheric effects (and cf. *Note* directly above on 259b11). Aquinas (8.1080), anticipating 260a3–10 (see on Argument *III.2*, 259b32–260a19, below, pp. 193–199, esp. 194–196) explains the claim that this cause is a moved mover as that thus the animal is variously related to it, and so is only intermittently in movement, whereas if the cause was an unmoved mover the animal would be always in the same relation to it, and so its movement would be everlasting.

Ch. 6, 259b16–22, b28–31 (Excluding b22–28): (*III.1.3*) Incidentally Moved Movers

For the overall structure of Argument *III.1* see the *Note on Ch. 6*, 259a29–b31: (*III.1*) *the argument for an unmoved first mover*, above (pp. 177–178); on the break at 259b16 see the *Commentary* immediately below (pp. 186–188); on the excluded passage here see *Ch. 6*, 259b22–28: (*III.1.4*) *continuity of the first principle of movement*, below (pp. 191–193); and on the role of 259b28–31 in the present argument, see below the *Analysis*, *Commentary* and *Notes* (pp. 186 & 188–191).

The immediate conclusion here, that unmoved movers incidentally moved by themselves cannot incite continuous movement, subsequently in *III.1.4* supports a key premiss of the overall argument, that there will only be a continuous relationship between the whole moving cosmos and its principle if the principle is unmoved (even incidentally; 257b27, cf. b23–24). Although this involves some overlap, for convenience I present here a translation of the whole of 259b16–31.

In all of these <i.e., self-movers> what first incites movement, and is responsible for each moving itself by itself, is moved, although incidentally. For the body changes place, so that what is in the body, and by means of leverage moves itself, also does. From this we can be assured that if there is any example of unmoved things that also move themselves incidentally, it cannot incite continuous movement.

259b16
b20

As a result, given that movement must be continuously, there must be that which first incites movement while being unmoved even incidentally, if there is going to be, just as we said, some ceaseless and immortal movement in the things there are, and if what there is is going to remain in itself and in the same place. For, if the principle remains, the whole must also remain, being continuous, in relation to the principle.

b25

Being moved incidentally by itself and by something else are not the same thing, for being moved incidentally by something else also takes

b30

place in some of the principles of all the things in the sky that are transported along multiple pathways,⁴ but the other only takes place in destructible things.

Analysis

The argument of 259b16–22 and b28–31 concludes that unmoved movers incidentally moved by themselves cannot incite continuous movement (259b20–22), since (a) the mover within an animal is essentially unmoved but incidentally moved by itself (259b16–18), because (a.i) it moves itself by a kind of leverage (259b19–20), since (a.i.i) the body of the animal changes place (259b18–19); and (a.i.ii) the unmoved mover is located within its body (259b19) – while (b) animals are not capable of continuous movement (supplied: cf. 259b4–6 above); and (c) nothing else contains an unmoved mover incidentally moved by itself (supplied: see below), since (c.i) being moved incidentally by oneself and by something else are not the same thing (259b28–29), because (c.i.i) some principles of those celestial phenomena carried around on multiple pathways are incidentally moved by something else (259b29–31); but (c.i.ii) only destructible things are incidentally moved by themselves (259b31).

Commentary

Graham (1999, pp. 110–115) following most scholars treats the whole of 259b1–20 as a single argument. This seems mistaken, since b16–22 forms a natural unit, despite Ross's indication of a break at b20, while 259b16–18, here *a*, is introduced by δέ ('and'/'but'), not specifying any particular logical relation to what precedes, and the topic changes now to incidental self-movement. Aristotle (trans.) starts a new paragraph at 259b16, while Philoponus (838.36 = 889.33, cf. 891.15–18) and Furley (1994/1978, p. 5) followed by Gill (1994, p. 15; cf. p. 16 n. 2) recognise that b1–16 forms a unit.

Aquinas (8.1080) includes 259b16–20 in the previous argument, as another explanation why animal movement is not continuous, that the internal unmoved mover's incidental movement changes the animal's relation to its external mover in the surroundings; yet given that this is itself moved that is irrelevant. Simplicius (1257.3–6, 1259.7–8) treats this passage as arguing that animals' unmoved movers are not properly sources of movement because, since they are incidentally self-moved, they are not entirely unmoved; as a poor argument this is unlikely, since there is nothing impossible about the concept

4 Removing Ross's comma after ἀρχαίς (259b30).

of an autonomous self-mover, and Aristotle's argument against animals being so (259b1–16) is essentially empirical.

Graham (1999, pp. 115–118) admits 259b16–20 “seem like an afterthought”, but insists they lead to the preceding argument's conclusion, because he thinks (i) the preceding passage established that animals are not continuous self-movers, whereas that is taken as self-evident (see the *Commentary* on 259b1–16, Argument *III.1.2*, above, esp. p. 181, and cf. Graham, 1999, p. 117), and (ii) somehow that should support the conclusion that self-movers cannot cause continuous movement (his [11], p. 116). The conclusion stated at 259b20–22 (above), is that unmoved movers that are moved incidentally by themselves cannot incite continuous movement, which follows essentially from the premisses that an animal's soul is incidentally self-moved (259b16–18, here *a*), and that animal movement is not continuous, here *b*. Graham effectively replaces the latter easily supplied premiss with his [10], that what is moved incidentally cannot cause continuous movement. Yet that is an overstatement contradicted by 259b29–31, here *c.i.i*; while even if a version of Graham's [10] was properly restricted to incidental self-movers for Aristotle, it could only be an inference from the observation that animal movement is not continuous, and not independently knowable in an analysis of why that is so, as Graham (1999, p. 116) claims it is. Morison (pp. 74–75), providing no analysis, asserts similarly that the conclusion is that the souls of self-movers cannot be responsible for the cosmos's continuous movement, and that this follows from the claim that the unmoved part of a self-mover is incidentally moved (259b16–18), together with the claim that unmoved movers incidentally moved by themselves cannot cause continuous movement (259b20–22); but that is clearly the conclusion (b20).

Simplicius (1259.35–1260.2), despite also thinking this passage belongs with 259b1–16, sees that here Aristotle “bases his argument on the case of mortal animals”, not concluding to it. He probably follows Alexander (fr. 687 Rashed), stating this is an argument by conversion of the conditional (“if a mover is incidentally moved, it does not cause continuous movement”) for the conclusion that the first mover must be unmoved even incidentally; but that ignores the important distinction between incidental self-movement and externally caused movement (259b28–29, here *c.i*); hence he interprets b20, “From this we can be assured” (ἐξ ὧν ἔστιν πιστεῦσαι) as implying the conclusion is only probable, by induction.

Philoponus (891.18–30), also treating this argument as supporting the general conclusion in 259b22–26 that there must be a first mover unmoved even incidentally, states the immediate conclusion correctly, that the unmoved mover of a self-mover cannot cause continuous movement (259b20–22), but

infers this from the mover's inability to maintain the moved body in the same condition continuously, anticipating b26–28, which is improbable. He restricts such self-movers to irrational animals (839.13–16), implying that in humans and presumably celestial movements, intellect is the prime mover.

Solmsen (1971, p. 176) claims that the treatment of animal souls as incidentally moved accords with the definition of incidental movement at *Ph.* 8.4, 254b7–12, as movement of what belongs to what is properly moved, or in respect of a part that is properly moved; in that case the soul would count as something belonging ($\tau\hat{\omega}$ ὑπάρχειν) to the living body.

The passage 259b28–31 (supporting Premiss *c*, that only animals' unmoved movers are incidentally moved by themselves) follows the intervening general conclusion to Argument *III.1*, 259b22–26, as a kind of footnote, as similarly the premiss to the argument of *III.1.4* at b27–28. The premiss and support excludes the possibility of a heavenly self-mover such as the world-soul in Plato even if mover and moved parts could be there distinguished (cf. Ross, pp. 707–708). Overlooking its role in the argument Wagner (p. 685) argues it is either a later insertion or intruded gloss.

Notes

On 259b19–20, here *a.i.*, Simplicius (1259.15–28) offers three interpretations of the leverage comparison: (i) the soul, like a lever is caused by something external to move the body; (ii) the soul touches the body, as a lever what it pushes; or (iii) the body's movement is unnatural for its elements, like that of what a lever moves (for this cf. Alexander fr. 686 Rashed). Ross (p. 707) and Graham (1999, p. 111) adopt (ii), but none is very convincing; perhaps Aristotle means (iv) to compare the body, not the soul, with a lever: the body is an intermediate, as a lever is, by which the soul moves itself (thus Cornford, p. 350 n. *a*).

Premiss *c*, that only animals' unmoved movers are incidentally moved by themselves, follows from the stronger claim that all self-movers are animals, for which see references in the *Commentary* on *Ch.* 6, 259b1–16: (*III.1.2*) *continuity of movement despite animal self-movement* (p. 181). Kosman (1994b, p. 142) argues the first heaven in *Cael.* is a self-mover (presumably inferring from *Ph.* 8, since in *Cael.* its movement is called natural, e.g., 1.2, 269b1–2), from which he deduces the first unmoved mover in *Ph.* 8.6 forms with the first heaven a self-moving whole. This is circular reasoning.

Simplicius (1262.5–13) argues that at 259b29 and b29–30, here *c.i* and support, we should not supply “incidentally” with “by something else” (as with “by

itself”), since Aristotle does not think that anything incidental can be everlasting, but no other scholars agree, since incidental existence is not at stake here.

At 259b29–31, here *c.i.i.*, stating that “some of the principles of ... things in the sky” (259b30) are incidentally moved by something else, Alexander (fr. 689 Rashed), Simplicius (1261.21–24), Aquinas (8.1082) and Apostle (p. 326 n. 31) interpret Aristotle as referring to the spheres supporting the planets, since the planets and all but the first of their supporting spheres, in Aristotle’s astronomy, are things moved incidentally by other movers, their supporting spheres (see *Metaph.* 12.8). Ross (pp. 102 and 708, cf. also Graham, 1999, p. 119), following Jaeger (pp. 360–361, 364–367), doubts ‘principles’ (ἀρχαί, *archai*) could refer to spheres as such; this seems incorrect, given that each sphere is responsible for a distinct component of a visible planetary body’s complex movement. Yet Ross and others, e.g. also Menn (pp. 441–442), suggest the principles referred to are the unmoved movers of those spheres that explain the movements of the planets, sun and moon. This presupposes that these movers are associated locally with their spheres, although the only purported evidence for this, *Ph.* 8.10, 267b6–9, would apparently locate the first mover on the first sphere’s equator, implying it has finite magnitude, contrary to the doctrine of Ch. 10 (see further below, esp. p. 346), and the only other plausible position, the poles, is excluded at *MA* 3, 699a20–24.

Whether or not Aristotle here refers to the spheres’ primary movers, the same problem arises for the view that the spheres are self-movers with souls like those of animals located in or in relation to them. Aquinas (8.1082) and Apostle (p. 326 n. 31) reject any such view, but Simplicius (1261.16, 26–28), followed by some modern commentators thinks the spheres are self-movers with souls as distinct internal movers. To avoid the problem that these would be incidentally moved by themselves, he appeals to Alexander’s claim (ap. Simplicius 1260.22–35, 1261.33–1262.1; cf. *Al.* fr. 688 Rashed) that the cosmos as a whole is the place of the prime mover: it is consequently unmoved, since, if only the parts within a rotating whole are moved, the mover extended in the whole remains unmoved. Then Simplicius (1261.30–33) further reports that Alexander thought the subordinate spheres’ souls are similarly distributed in their spheres so they are not incidentally moved by themselves, but only by the superior spheres supporting each and moved on different axes (appealing presumably to the model of *Metaph.* 12.8). This is undoubtedly Simplicius’ own view and misrepresents Alexander, who actually thought the spheres’ souls were their physical nature, not distinct entities within them (Simplicius *in Cael.* 380.29–381.2, 387.5–19; cf. *in Ph.* 1262.3–5). This has a double significance, first suggesting that for Alexander these souls’ rational desire for the prime mover should only be a quasi-

passive power of being moved and their spheres could only in an equivocal sense be self-movers (cf. Alexander *On the Cosmos* 9–28, and Rashed, pp. 131–134); second, implying that contrary to Simplicius (*in Ph.* 1261.30–33, cf. Rashed pp. 155–156), what Alexander meant must be that the spheres themselves (identically with their souls) are incidentally moved by superior supporting spheres, whatever he thought about their individual movers (cf. Alexander *On the Cosmos* 92–96). Philoponus (891.31–892.24, 892.25–28 = 839.17–20) is little help: like Simplicius, he regards the souls of planetary spheres as their unmoved movers and incidentally moved by superior spheres, yet attempts an explanation on the theory of epicycles incompatible with Aristotle's conception of place.

Two distinct questions remain here, whether Alexander might be right that for Aristotle the prime mover is extended throughout the cosmos (or first moved body), for which see below, the *Commentary on Ph.* 8.10, 267b6–9 (pp. 346–347), and Blyth (2015, Ahead of Print pp. 25–29, cf. pp. 23–24); and second whether, as Simplicius suggests, Aristotle's reference to principles incidentally moved by something else might include souls of the spheres, as their distinct, internal, unmoved movers, or only the spheres. Simplicius' case (1261.30–33) involves (i) distinguishing planetary souls from the first mover, following Alexander, because the former are not separate from their spheres, yet (ii) applying to them Alexander's account of the first's location throughout its sphere. Then, since the axis of each subordinate sphere is carried at an angle to the axis of the first sphere and depends on it (so that the subordinate axes are moved, with their poles circling the pole of the superior sphere), it follows, Simplicius thinks, that the souls in these spheres are incidentally moved by the first's movement. But this could only occur if each soul is directionally oriented to its own sphere's axis; and that only seems possible if the soul corresponds locally part-by-part with its sphere. But then it must also rotate along with its own sphere, contrary to 259b31, here *c.i.ii*. In that case Aristotle here must only refer to planetary spheres, not their movers, and moreover the passage excludes the possibility of heavenly self-movers containing distinct unmoved movers. This is consistent with other passages discussed above showing that Aristotle thinks the only self-movers are terrestrial animals.

Bodnár (2002, pp. 174–175) distinguishes two possible construals of 259b29–31: either (i), among “the things in the sky” (τῶν ἐν τῷ οὐρανῷ), the clause “[all those] that are transported along multiple pathways” (ὅσα κτλ: that is, those concerned with planetary movement), distinguishes just those whose principles (ἐνίοις ἀρχαῖς) are incidentally moved by something else; or, (ii) “[all those] that are transported along multiple pathways” distinguishes certain “things in the sky”, that is, those as a whole concerned with planetary movement, only *some* of whose principles are incidentally moved by something else. The trans-

lation and *Analysis* here adopts (ii), as concerning all spheres subordinate to the first, that of the fixed stars, and so moved by other spheres, and excluding further principles of planetary movement, the first sphere and the prime mover (and perhaps also unmoved movers of the others spheres, according to the system of *Metaph.* 12.8), none of which can be incidentally moved. Bodnár (2002, p. 176) prefers (i), interpreted as referring to the souls of the subordinate spheres, assuming that ‘principles’ could not mean bodies (but see above), in which case he thinks the distinction in (ii) would have to include the first sphere contrary to the restriction to planetary movements, but he appears to be mistaken. Zekl (trans., p. 197 with p. 288 n. 105), takes the genitive τῶν ἐν τῷ οὐρανῷ (b30) as partitive (“certain principles *among* the things in the sky”) and identifies these as the planets themselves, but the neuter in ὅσα κτλ (259b30–31) is then difficult.

Seeck (p. 158) thinks that 259b28–31 are a later addition because he assumes they refer to the spheres’ movers, and he argues that originally the whole of what is now 260a1–19 made no reference to other astronomical moved movers except the sphere of the fixed stars (see *Commentary* on 260a5–10 below, pp. 195–196).

Ch. 6, 259b22–28: (*III.1.4*) Continuity of the First Principle of Movement

As a result, given that movement must be continuously, there must be that which first incites movement while being unmoved even incidentally, if there is going to be, just as we said, some ceaseless and immortal movement in the things there are, and if what there is is going to remain in itself and in the same place. For if the principle remains the whole must also remain, being continuous, in relation to the principle. 259b22
b25

Analysis

The overall conclusion of Argument *III.1*, established here, is that there must be an absolutely unmoved (everlasting) first mover (of the cosmos) (259b23–24), because (a) what there is (altogether) must remain (everlastingly) itself in itself and in the same place (259b26), because (a.i) there must be continuous, ceaseless, everlasting movement in the things there are (259b22–23, b24–26; cf. *Ph.* 8.1), since (a.i.i) self-movers do not initiate their movement completely independently (*III.1.2*) – and (a.ii) everlasting movement depends on an integrated, stable moving cosmos (supplied; cf. 259b32–260a19, *Ph.* 8.7–9, *Cael.*, *GC*, *Metaph.* 12.6, 8 and 10) – while (b) the continuity of the whole (cosmos)

depends on its continuous relationship to its principle (cf. 259b27–28); and (c) there will only be this continuous relationship if the principle is unmoved (even incidentally) (257b27), because (c.i) a first mover must be unmoved (*III.1.1*; cf. *Ph.* 8.5); and (c.ii) unmoved movers incidentally moved by themselves cannot cause continuous movement (*III.1.3*).

Commentary and Notes

Graham (1999, p. 118) remarks on the Parmenidean language of 259b24–26, here *a* and *a.i*, comparing 260a17–19, describing similarly the prime mover's ontological status.

At 259b26, here *a*, the claim that the cosmos must remain in the same overall disposition and place, is connected to b24–26, here *a.i*, stating movement is everlasting, by καί ('and'). This is here understood in the sense 'that is to say' (LSJ s.v. A.I.2), to introduce an implication ('and so'). Thus *a.ii*, the requirement for a stable cosmos to ensure everlasting movement, has been supplied, stating the presupposition motivating the goals of showing that rotation (as the movement of astronomical bodies) is the first movement (in Chs. 7–9), and that two such movements combined will be sufficient to produce terrestrial changes (259b32–260a19, immediately below, *III.2*). Simplicius (1260.35–38) somewhat similarly explains 259a26, here *a*, as contributing to the inference that the mover is absolutely unmoved, by explaining why the whole cosmos is everlasting. As he then indicates, this parallels the inference in Plato's *Phaedrus* at 245d7–e2.

Simplicius (1260.17–22; cf. Aquinas, 8.1081) probably rightly interprets "what there is" (τὸ ὄν, *to on*, 259b26), here in *a*, as referring to the whole cosmos, although Apostle (p. 325 n. 27) suggests it might mean just the first celestial sphere, as most changeless. Simplicius (loc. cit.) explains αὐτὸ ἐν αὐτὸ καὶ ἐν τῷ αὐτῷ ("in itself and in the same") here as signifying that the cosmos changes neither identity nor place, retaining both the form of its being and a single movement; Apostle (trans., and p. 325 n. 28) supplies here 'state' not 'place', signifying changelessness except for rotation. Graham (trans., and p. 118) is agnostic, but thinks perhaps both are implied.

Apostle (pp. 325–326 ns. 29–30) thinks 'the whole' (259b27, here *b* and *c*), refers to the first sphere of the fixed stars, which is in a continuous relation to its unmoved mover because as a whole it remains in the same place and state, whereas the parts alone change place. But there has not been any mention of the celestial spheres barring the vague "of one moved body" at 259a18–19

(although cf. b29–31, coming next in the text but discussed above), and none yet of rotation. It seems more natural to take it as referring to the whole cosmos.

Ch. 6, 259b32–260a1: (*III.2.I*) Argument for the First Moved Body

But in fact if there actually always is something like this, something inciting movement but itself unmoved and everlasting, what is first moved by this must also be everlasting.

259b32

260a1

Introductory Note

Aristotle here introduces Argument *III.2*, showing there is one first everlastingly moved body (stated 259b33–260a1). This is the second part of Argument *III* from previously established principles, formally demonstrating, like Arguments *I* and *II*, that there is one everlasting unmoved mover, but actually answering the question raised at the end of Ch. 3, whether there are also, in addition to alternately moving and resting things, also both things everlastingly motionless and things everlastingly moved. Argument *III.1* establishes the former, *III.2* the latter, formally as a corollary to *III.1*, with two sub-arguments, (*III.2.I*) from the everlasting mover, in the present passage (259b32–260a1), and thereafter (*III.2.II*) from generation and destruction (260a1–10). On the structure and role of Argument *III* see further the *Analysis* in Ch. 6, 259a20–29: (*III*) *argument from previously established principles, introduction* (p. 176), and for the overall structure of Ch. 6 see the *Introduction* (p. 160), and *Commentary* on the first passage (pp. 162–163). By contrast Alexander (fr. 693 Rashed), and Philoponus (893.30–894.2, 895.3–13), treat 260a1–19, here Argument *III.2.II* and then the solution to the remaining problem from Ch. 3, as the first of two arguments that the first moved body is everlasting, the second beginning at the start of Ch. 7. Philoponus (893.6–14) argues that, notwithstanding Aristotle's inference from an everlasting moved body to its unmoved mover at 259a18–20 in Argument *II*, the inference from the latter to the former here in Argument *III* is not logically circular, since in both cases Aristotle infers to an everlasting cause, and he shows that whether someone assumes it is unmoved or moved, either way the other is also implied.

Analysis

Argument *III.2.I* is extremely brief, inferring the body's existence (259b33–260a1), because (a) it must exist if there is an everlasting first mover (259b32–33, cf. 260a14–15); and (b) there is an everlasting first mover (supplied: see Argument *III.1*, 259a29–b31).

Commentary

Aquinas (8.1083) states, slightly inaccurately, that in 259b32–260a19, here Argument *III.2* and sequel, Aristotle proves that the first movement is everlasting (not that there is one first everlastingly moved body), but he is right to distinguish this from the proof of the everlastingness of movement in general in *Ph.* 8.1. Waterlow (1982, p. 228 n. 13) claims this passage completes the argument of 258b26–259a6 above (in effect Argument *I* here, for an unmoved mover from the cause of generation), by inferring from the latter conclusion to the existence of a single everlastingly moved body, but in fact Argument *III.1* has meanwhile reached the former result again (259a29–b31) immediately before the present passage, and these should rather be taken together; see further the *Introduction* to Ch. 6 (pp. 160–162). Wagner (pp. 685–687) provides a useful summary (in German) of Aristotle's cosmological assumptions here.

Ch. 6, 260a1–10: (*III.2.II*) Argument from Generation and Destruction

This is the second argument for the existence of a unique first everlastingly moved body, based on the requirements of Aristotle's cosmology. For its role in the chapter see the *Introductory Note* on the preceding passage.

260a1 *This is clear also from the fact that there could otherwise not be generation and destruction and change for the rest of things, unless something moved moves them. For what is unmoved always incites one movement*
a5 *and in the same way, since it does not itself change in relation to what is moved. But what is moved by what is indeed moved, but moved in this case by what is unmoved, because of its having now this and now that relation to things, is not responsible for the same movement, but because of its being in opposed places or forms it will cause each of the other things*
a10 *to be moved in opposite ways, and sometimes to be at rest, and at other times to be in movement.*

Analysis

Aristotle argues here that there is a first everlastingly moved body (260a1; cf. 259a33–260a1), because (a) there must be an (everlastingly) first moved mover to cause (everlasting) generation and destruction and universal change in other things (260a1–3; cf. a10–14), since (a.i) the unmoved mover always causes one movement the same way (260a3–4, a14–15), because (a.i.i) it does not change in relation to what it moves (260a5, a17–19) – and (a.ii) what is then

(everlastingly) moved by the first moved mover causes generation, destruction and universal change in other things (supplied; cf. 260a15–17), because (*a.ii.i*) this causes both movement and rest in things (260a5–7, a10), since (*a.ii.i.i*) it does not cause just one movement, (260a8), because (*a.ii.i.i.i*) it is related variously to things (260a7) – rather, (*a.ii.i.ii*) it causes each other thing to be moved in opposed ways (260a9–10), because (*a.ii.i.ii.i*) (at different times) it is in opposite places and forms (260a8–9).

Commentary

Graham (1999, p. 119) claims that 260a1–3, here *a*, does not really support the claim the first moved body is everlasting, only that it is an intermediary. This is wrong: ‘everlasting’ must be supplied here (in thought at least) as an attribute of both terrestrial change (260a2) and the first moved body (260a3, and cf. *a.ii*), following the description of that body in the conclusion (259b33–260a1; cf. 260a14–15), since what is moved will only normally be moved as long as the mover is in contact (*Ph.* 3.2, 202a8–9; 7.2, 243a32–35). Noted apparent exceptions are elemental (*Ph.* 8.4, 254b33–256a3, n.b. 255a34–b1) and projectile (*Ph.* 8.10, 266b27–267a20) locomotion.

Seeck (pp. 155–158) argues that this passage, implying a fourfold scheme (everlasting unmoved mover, first everlasting moved body, second everlasting body moved by the first, and things moved only intermittently) is inconsistent with the triple scheme (excluding the second everlasting body) hitherto proposed in *Ph.* 8; he compares the former with *GC* 2.10 and the latter with *Cael.* I, suggesting that these two different explanatory systems are confused in this passage, and that references to the fourfold scheme are later insertions. It seems better to treat them as consistent elaborations in more detail of one explanation.

Waterlow (1982, p. 227) observes that Aristotle’s claims here are made in abstract metaphysical terms, all that is required for his present purpose, but that it is implied they must be instantiated physically in the perceptible cosmos. As Ross (p. 708) notes (cf. Waterlow, 1982, p. 230 n. 15, Graham, 1999, pp. 119–120, and Themistius, 225.2), Aristotle clearly thinks in 260a5–10, here *a.ii* and support, of the sun’s annual movement along the ecliptic, producing warming and cooling, elemental change, summer and winter, and so birth and growth, and disease and death. Being ‘in opposite places’ (260a8–9, here *a.ii.i.ii.i*), thus means being at the northern and southern tropics at corresponding solstices. Ross (p. 709) suggests that “opposite ... forms” (ἐναντίοις ... εἴδεσιν) implies configurations of all planets (including sun and moon), on the grounds that these have an astrological effect (cf. Alexander fr. 698 Rashed). Aquinas (8.1084) proposes that Aristotle speaks hypothetically, not yet ruling out alter-

ation as the first movement (cf. *Ph.* 8.7), but as Ross (loc. cit.) says, the phrase cannot imply alteration in the heavens, nor easily stand for “causing opposite effects” (heat and cold: thus Simplicius 1263.22–24 and Philoponus 839.24–28 = 894.16–21). Yet Ross endorses Simplicius’ literary explanation (1263.24–29) motivated by his Neoplatonic aim to reconcile the two philosophers, that it recalls divine soul in Plato’s *Phaedrus* 246b7, “coming to be in different forms” as it circles the whole world. Nevertheless by ἐῖδεσθαι Aristotle may just mean “opposite orientations” (directional appearances).

The text does not indicate whether Aristotle thinks he has adequately explained why the sun’s movement differs from that of the fixed stars. (The sun’s annual passage through the zodiac is in the opposite, eastward, direction to the diurnal, westward, movement of all the fixed stars, with which the sun is also carried around the earth, producing day and night; the path of its annual movement along the ecliptic, i.e., through the zodiac, is angled to the celestial equator’s plane, parallel to which the fixed stars appear to rotate.) If we assume, given the reference above to celestial objects carried on multiple pathways (259b30–31), that Aristotle has in mind something roughly like the cosmological system of *Metaph.* 12.8 adapted from Eudoxus (cf. Wicksteed, “Introductory Note to Ch. 6”, pp. 338–41), we can supply the further explanation for 260a8–9, here *a.ii.i.ii.i*, (that the movement of the second moved body varies), because (**a.ii.i.ii.i*), in addition to the single movement it receives incidentally from the first moved body, it will be moved intrinsically with another different movement of its own, the compound effect of both of which is an everlastingly varying movement (supplied: see *GC* 2.10, 336a18–b10 and *Metaph.* 12.6, 1072a9–18; cf. 12.8, 1073b8–1074a10). But *Cael.* 2.12 recognises compound celestial movements from a teleological point of view attributing all a planet’s movements to itself and makes no mention of a Eudoxan type of system (cf. Blyth, 2015, Ahead of Print pp. 16–20).

Note

On 260a5–7 and a9–10, here *a.ii.i* and *a.ii.i.ii*, Simplicius (1262.33), as McKirahan (trans. of Simplicius, p. 162 n. 110) notes, mistakenly identifies the immediate cause of variety as the first moved body, not the second, moved by this. That is probably just a slip of the pen, since otherwise he reports Aristotle here correctly.

Ch. 6, 260a11–19: Solution to the Remaining Problem from Chapter 3

Now, from what has been said, what we were in fact puzzled by at the beginning has become evident, why it is not the case that everything is either at rest or in movement, nor some things always in movement and others always at rest, but some things are sometimes in movement and at other times not. For what is responsible for this is clear now, that some things are moved by something unmoved and everlasting, because of which they are always in movement, but others are moved by what is in movement and changing, so that they must also themselves change. But what is unmoved, just as was said, since it simply and continuously remains just as it is in the same condition, incites just one simple movement.

Analysis

Aristotle here concludes that he has answered the question initially raised, why some things alternate between movement and rest (260a11–14; cf. Ch. 2, 253a5–7, Ch. 3, 253a23–24), because (a) manifestly the reason there is a body everlastingly moved with only one simple movement is that it is moved by an absolutely unmoved everlasting mover (a14–15, a17–19); and (b) manifestly the reason other things are moved varyingly is that they are moved by moved movers (a15–17), because (b.i) terrestrial things are moved by a second everlastingly moved body (supplied; cf. 260a5–7, a9–10); and (b.ii) the second body's movement and so influence varies (supplied; cf. 260a7–9), because (b.ii.i) the first body moving it is itself in movement (supplied; cf. b14–19).

Commentary

The previous passage, explaining why things that are sometimes moved and at others at rest always continue so, concludes the solution to the problem raised at the beginning of *Ph.* 8.3 (cf. Lang, 1998, p. 211, and above, the *Introduction* to Ch. 6, p. 160). At Ch. 3, 253a24–30 (see pp. 55–57) Aristotle first analysed possible dispositions of the cosmos, that either (i) everything must always be at rest (253a24, rejected Ch. 3, 253a32–b6, 254a23–33), (ii) everything must always be in movement (253a24–25, rejected Ch. 3, 253b6–254a3), (iii.α') some things are always in movement and others always at rest (253a26–27, rejected Ch. 3, 254a3–15), (iii.β') everything alternates between movement and rest (253a27–28) or finally (iii.γ') some things are always in movement, others always at rest and yet others alternate between movement and rest (253a28–30: Aristotle's view, repeated at 254b6). The decision between *iii.β'* and *iii.γ'*, whether,

in addition to things alternating between movement and rest, there are things everlastingly moved and things everlastingly at rest, is now concluded with the demonstration in Ch. 6 that there is a first everlastingly moved body and absolutely unmoved mover.

The analysis of possible dispositions of the cosmos *i-iii.y'* announced at the start of Ch. 3 does not just pose the question whose answer demonstrates these first causes as distinct types of beings, but also (at 253a22–24 and a30–32) provides the basis for answering other questions raised in the previous Ch. 2. The most fundamental is explicitly stated at 253a23–24, “why some beings are sometimes in movement and at other times at rest again” (cf. Ch. 2, 253a5–7). This is one of the three questions left open by Ch. 2, along with how there can be everlasting movement (Ch. 2, 252b35–253a1) and how animals can seem to start moving themselves (Ch. 2, 253a20–21).

The question about self-movers is answered again in Ch. 6, 259b1–16, not in much more detail than in Ch. 2, but now in a context recognising the influence of “what surrounds” terrestrial life, of cosmological causes, including implicitly the influence of the sun on birth, growth, illness and death, and on waking and sleeping, and other more local influences following from that, such as the intermittent availability of food. Moreover the second question, how movement can be everlasting, has also now been answered in terms of the continuously unchanging relation between the first unmoved mover and the first moved body, at 259a13–20 (in Argument *II*), 259b22–28 (in *III.1*), and 259b32–260a10 (in *III.2*). Now Aristotle points out that the remaining question, explicitly mentioned at Ch. 3, 253a22–24, why in general the beings that alternate between movement and rest do so, has also been answered at 260a1–10 in Argument *III.2.II*, by the cosmological account of the relation between the first moved body, with its constantly similar movement, and the second body moved by the former, whose movement, caused by a cause itself in movement, must be varied (260a5–10), and so its causal influence on terrestrial life and the elements is also varied, as discussed above.

One important further question, not yet raised, remains regarding Aristotle's doctrine that everlasting cosmic movement depends on one single continuous movement. This is the problem what form that single everlasting change takes, and how it can be everlastingly continuous, the topic of Chs. 7–9.

The Priority of Locomotion

Introduction to Chapter 7

The new start announced in Ch. 7 (Part A, 260a20–26) does not begin Bk 8's inquiry anew; yet it introduces a different approach (μέθοδος: *methodos*, 261a30–31, cf. 251a7) to the topic raised in *Ph.* 8.3, 253a24–30, 254b1–6, and in 8.6 restated (259a22–29) and first answered, whether and what everlastingly moved and everlastingly unmoved things there are in addition to perishable things alternating between movement and rest. Ch. 6 argued for a positive answer to the question whether there are such things, invoking imprecisely a cosmological account of the everlasting movements, but the approach of the present chapter methodologically puts those conclusions in doubt, since it has not yet been established that any particular everlasting movement is physically possible, as the effect of an everlasting unmoved mover (260a21–22); answering this question involves specifying what kind of movement that might be, and then demonstrating that this movement (locomotion), or rather one species of it (rotation), is free of the restrictions which make all other movements incapable of everlasting continuity.

Ch. 7 accordingly first establishes that locomotion is prior to the other forms of movement (Part B, 260a26–261a26), and second that none of those could be everlasting (Part C, 261a27–b26). Then Chs. 8 and 9 respectively show there is a form of locomotion, rotation, that can be continuous, and that rotation is prior to all other forms of locomotion and other kinds of movement generally. That the primary movement in the cosmos is the everlasting diurnal rotation of the sphere of the fixed stars then leads to deduction of further characteristics of its unmoved mover in Ch. 10, implying the latter is not a subject of further physical, but only metaphysical, inquiry (cf. *Ph.* 8.1, 251a5–8 and *Metaph.* 12.6–10). Solmsen (1960, p. 235) compares Aristotle's inquiry here with Plato at *Laws* 10.897d–e, where having argued that soul is the first mover of the cosmos, the Athenian asks what particular movement its divine intellect causes.

The term 'locomotion' is conventional in English, but φορά (*phora*, e.g., 260a28) means literally 'transportation' (< φέρω: *pherō*, 'to carry'), corresponding with Aristotle's assumption that what incites movement continues to act on what is moved while movement continues: consequently *being carried* is for him a paradigm of locomotion (only really breaking down in the case of an unmoved mover).

Ch. 7, 260a20–26: (A) A New Start, Definition of the Task

7, 260a20

In any case, if we make in addition another start, the truth about this will be more evident. For we should investigate whether it is possible for any movement to be continuous or not, and if it is possible, what this movement is, and which is the first kind of movement. For it is clear, if indeed there must be movement always, and this kind is first and continuous,

a25

that what first incites movement incites that movement, which must be one and the same and continuous and first.

Analysis

Aristotle announces that a new start will establish the truth about everlastingly moved things (260a20–21), since (a) an investigation is needed to consider three things,

- (i) whether it is possible for any movement to be continuous (i.e. everlasting);
- (ii) if so, what this movement is; and
- (iii) what the first kind of movement is (260a21–23),

since (a.i) clearly the first mover moves a movement that is one and the same, and continuous and first (260a23, 25–26; proven *Ph.* 8.6, 259a32–260a5), because (a.i.i) there must always be movement (260a23–24; proven *Ph.* 8.1–2); and (a.i.ii) the everlasting movement must be first and continuous (260a24; proven *Ph.* 8.6, 259a13–20).

Commentary

Simplicius (1264.24–28) says the first sentence (260a20–21) refers to the truth about both the first mover and moved body, and the result of the new start involves a new proof that both are everlasting (but cf. *Commentary* below on the first mover in Ch. 10, pp. 342–353). Zekl (p. 288 n. 111) and Ross (p. 709), following Simplicius (1264.30–32), observe that of the questions raised here, the first addressed is the last, (iii) what the first kind of movement is, then from 261a27–265a12 (i.e., to the end of Ch. 8) the former two, (i) whether any can be continuous, and (ii), if so, which (cf. also, less precisely, Philoponus 895.8–11). Alexander (fr. 719 Rashed) thus treats the proof that rotation is the only continuous movement (first mentioned in Ch. 8) as beginning from 261a31 in Ch. 7.

Aquinas (8.1087, cf. 1097) treats the text from this point to Ch. 9, 265b16 as all showing which kind of movement is first, given it must be continuous, which comes to the same thing, except that the last part of Ch. 7 only shows

that none of the other movements can be continuous. Simplicius (1264.20–22, 30, 32–34) in introducing the chapter also assimilates the demonstrations that only rotation is continuous and that it is first. Moreover he alone (1264.34–35) explains Aristotle's initial ordering of the questions: (i), the question whether, is logically prior to the question what, i.e. (ii) and (iii), on which McKirahan (trans. of Simplicius, p. 163 n. 138) refers to *APo.* 2.1, 89b29. Aristotle reverses this order in practice, since identifying (iii) what movement is first, (ii) *qua* continuous, will incorporate a proof (i) that it can be continuous.

Note

Aquinas (8.1086) thinks 260a23–26, here *a.i.*, the previous result that the first movement is one and the same, *qua* continuous, is meant to answer someone who thinks it might not be continuous. Yet it seems rather to provide a reason ('For', 260a23: γάρ) for pursuing the questions, that what was arrived at by one approach should be tested and, if possible, confirmed and clarified by another. See partly similarly Simplicius (1265.1–7), an elaborate paraphrase of the sentence, although partly misled by Alexander (fr. 703 Rashed) who derives instead as the implication the result that the prime mover causes the movement under investigation; Philoponus (896.10–14 = 839.31–33) has the emphasis in the result right, but derives it from the fact the mover is first, one and changeless, not in the text, nor, I think, specifically implied, although it is assumed that the everlasting movement is caused by the first mover.

Note on Ch. 7, 260a26–261a26: (B) The Priority of Locomotion and its Implications

At 260b5–7 a complex argument is stated (only component statements numbered): if (S.1) there is always movement, (S.2) there must always be locomotion, (S.3) as the first kind of movement, and if (S.4) there is a first and subsequent kinds of locomotion, (S.5) there must always be the first kind (260b6–7). This complex statement occurs as a corollary to the conclusion of the first of a series of arguments for the priority of locomotion (see below, pp. 203–204), and could otherwise be treated in context as a footnote by Aristotle, except that the first conditional here infers (S.2) everlastingness of locomotion from (S.1) the doctrine of Chs. 1–6 that movement is everlasting together with (S.3) the priority of locomotion, and the second conditional then foreshadows the results of *Ph.* 8.8–9 regarding rotation (here S.4) and so S.5, on the basis of the results S.1, S.3 and so S.2, and so is more generally part of the overall logical structure of the Bk 8.

In 260a26–29 at the beginning of the passage containing this argument Aristotle states (S.6) his doctrine of three kinds of movement (*κίνησις*, *kinēsis*, excluding generation and destruction): change of size, affection (quality) and place. There the doctrine functions as an additional premiss to a first argument for the priority of locomotion, but it is noteworthy that from (S.6) the doctrine of kinds of movement, together with (S.3) the claim that locomotion is the first kind of movement, we can immediately reach the general complex conclusion stated above from 260b6–7: i.e., it will follow from these with the first protasis (S.1), that there is always movement, that (S.2) there is always locomotion, and then that if (S.4) there is a first, and a subsequent, kind of locomotion, (S.5) there must always be the first kind. In Ch. 9, 265a13–b16, Aristotle will establish (S.7) that rotation is the first kind of locomotion, and Ch. 8 establishes (S.8) that there can always be rotation, from which it follows (S.9) that there must always be rotation.

This reasoning can be reformulated as follows. Aristotle claims there must always be rotation (supplied, above S.9), because (a) among forms of locomotion, only rotation is possible everlastingly (Ch. 8, above S.8); and (b) rotation is the first kind of locomotion (Ch. 9, 265a13–b16, above S.7); while (c) there must always be the first kind of locomotion (260b6–7, above S.5), since (c.i) there is a first and subsequent kinds of locomotion (260b7, cf. Ch. 8, 261b28–31 and Ch. 9, 265a13–16, above S.4); and (c.ii) there must always be locomotion (260b6, above S.2), because (c.ii.i) there is always movement (Chs. 1–6, above S.1); and (c.ii.ii) there are three kinds of movement, change of quality, size and place (260a26–29, cf. *Ph.* 5.1–2, above S.6); while (c.ii.iii) locomotion is the first kind of movement (see here Part B, 260a26–261a26, above S.3, cf. Ch. 9, 265b17–266a6); yet (c.ii.iv) none of the others can be everlasting (see here below, Part C, 261a27–b26).

In the present chapter the claim *c.ii.iii* = S.3, that locomotion is the first kind of movement, is supported in Part B by a series of four separate main sub-arguments, (I) from the physical preconditions of other movements (260a26–b7), (II) from expert beliefs (260b7–15), (III) from the forms of priority (260b15–261a23; for further sub-arguments within this section see below), and (IV) from self-movement (261a23–26). Aquinas (8.1087) identifies three arguments here as follows: (i) from the properties of movements (260a26–b15), i.e., I and II here together (although at 8.1089 he does distinguish these), (ii) by the distinction of prior and posterior (260b15–261a23), i.e. III here, and (iii) by the order of things in movement (261a23–26), i.e. IV here.

Kouremenos (p. 28 n. 21 and pp. 29–30) raises the interesting question whether Aristotle means to say that all locomotion, or only rotation, is prior to other kinds of changes, answering that he means all. Indeed Aristotle does

not introduce any qualifications to the claim, and his examples in Arguments I–III here imply this holds for rectilinear movements too.

Ch. 7, 260a26–b7: (B.I) From the Physical Preconditions of Other Movements

Given that there are three kinds of movement, that in respect of magnitude, that in respect of an affection, and that in respect of place, which we call transportation,¹ the latter must be first. For it is impossible that there is growth unless alteration already takes place. For in one way what is increased is increased by what is similar, and in another way by what is dissimilar. For what is opposite to something is called its food. And everything is added to something by becoming similar to it. Then the change into opposites is necessarily its alteration. But in fact if something is altered, there must be something that alters it and makes out of the potentially hot something actually hot. Then it is clear that what incites movement does not keep to a similar position, but at one time it is closer, but at another time further from what is altered. And this cannot take place without transportation. So if there must always be movement, there must always be transportation as the first kind of movement, and if there is a first and subsequent kind of transportation, there must be the first kind.

260a26
a30
260b1
b5

Analysis

Aristotle states two claims and supports the first (1), that locomotion is the first kind of movement (260a28–29, b6), with his regular doctrine (1.a) that there are three kinds of movement (260a26–27), since (1.a.i) there is change of size (growth and shrinkage), change of affection (alteration) and change of place (i.e., locomotion) (260a27–28; proven *Ph.* 5.1–2, 225a1–226b18) – but (1.b) there can be no growth without prior alteration (260a29–30), because (1.b.i) what grows is increased in one way by what is similar, and in another by what is dissimilar (260a30–31), since (1.b.i.i) nutrition is said to be opposite to what it nourishes (260a31–32); but (1.b.i.ii) everything is incorporated by becoming similar to what incorporates it (260a32) – and (1.b.ii) change into the opposite is alteration (260a33) – while (1.c) alteration cannot be present without locomotion (260b4–5), because (1.c.i) if something is altered there

1 I.e., locomotion (φωρά): on the translation see the *Introduction* to Ch. 7, final paragraph.

must be something causing alteration by making the former, which was (say) potentially hot, actually hot, (260b1–2); but (1.c.ii) this cause of alteration is clearly not always in the same position, but at one time further from, and at another nearer to, what is altered (260b2–4).

Aristotle also claims (2) that, if there is a hierarchy of kinds of locomotion there must always be the first kind [rotation: cf. *Ph.* 8.8] (261b6–7; cf. *Ph.* 8.9, 265a13–b16), because (2.a) there must always be locomotion (260a6), because (2.a.i) locomotion is the first kind of movement (260b6, cf. 260a28–29; = 1 immediately above); and (2.a.ii) there must always be movement (260b5; cf. Chs. 1 and 6).

Commentary

I present conclusion 2 and its support separately here, as a corollary, because 1 is also the conclusion of coordinated Arguments II–IV following. See further *Note on Ch. 7*, 260a26–261a26: (B) *the priority of locomotion and its implications* immediately above (pp. 201–203). Wagner (p. 688) finds 260b5–7 suspicious because it goes beyond 1, but the reasoning presented supports 2 and is coherent with that for 1.

Philoponus (896.15–19 = 840.1–4) gives an essentially correct syllogistic analysis of 260a29–33, deriving the dependence of growth on alteration (260a29–30, here 1.b), directly from the assimilation of food, originally opposite to the body (260a30–32, here 1.b.i) with support, together with the principle that change into the opposite is alteration (260b33, here 1.b.ii). Graham (1999, p. 121) discusses the hierarchy of dependence of kinds of movement one upon another, growth upon alteration, and alteration upon locomotion, that this argument establishes, arguing (p. 122) that the dependence of alteration upon locomotion (approach of the cause toward the effect, or vice versa) does not contradict the claim (*Categories* 14, 15a18–27) that alteration is intrinsically distinct from any other movement.

Notes

On 260a32, here b.i.ii, see *de An.* 2.4, 416a19–b9 for Aristotle's account of nutrition as assimilation of what is initially actually dissimilar but potentially similar, to the matter of the living body. *GC* 1.5 treats the physics of growth more generally and thoroughly.

Regarding 260b4–5, here c, the premiss that alteration depends on locomotion, Kouremenos (p. 28 n. 21) rightly criticises Simplicius (1265.36–1266.2) for not recognising that this argument is completely general, not limited to the case of nutrition regarding growth.

Ch. 7, 260b7–15: (B.II) Argument from Expert Beliefs

Moreover the principle of all ways of being affected is condensation and rarefaction. For both being heavy and light, and soft and hard, and hot and cold are thought to be *(respectively)* kinds of thickness and thinness,² and condensation and rarefaction *(are thought to be respectively)* blending and separation, in respect of which the generation and destruction of substances is said *(to occur)*. But things that are blended and separated must change place. And indeed the magnitude of what is increased or diminished changes place.

Analysis

This argument for the priority of locomotion depends on the premisses (a) that alteration, and also generation and destruction, require locomotion (supplied), because (a.i) the principle of all ways of being affected is condensation and rarefaction (260b7–8), since (a.i.i) heavy and light, and soft and hard, and hot and cold are considered to be kinds of density and rarity (260b8–10); while (a.ii) condensation and rarefaction are blending and separation, through which generation and destruction of substances are said to occur (260b11–12); and (a.iii) things that are blended or separated must change place (260b12–13) – and again (b) the magnitude of what is increased or decreased changes place (260b13–15).

Commentary

Cornford and Wicksteed each (p. 356 n. a) note the likelihood that Aristotle here adopts *ad hominem* earlier materialists' beliefs. As Wicksteed says, *Ph.* 8.9, 265b17–266a5 argues that all his predecessors thought locomotion was the first kind of movement. Graham (1999, pp. 122–123) shows, referring to *Cael.* and *GC*, that Aristotle rejects the Presocratic reduction of all changes to blending and separation, endorsing Philoponus' view (896.20–32, cf. 840.5–13), that this argument is dialectical; cf. also Aquinas (8.1089), Furley (1989, p. 134) and Zekl (p. 289 n. 114), noting the inconsistency with *Ph.* 4.9. Zekl (loc. cit.), declaring Aristotle here “mit fremden Kalbe pflügt”,³ also notes inconsistency with *Ph.* 4.1, 208b26–27. Simplicius (1267.19–29) by contrast accepts this as Aristotle's doctrine, since it sounds like Plato's *Laws* 10.893e, while he assumes

2 For the punctuation and consequently implied supplement thereafter see Wagner (p. 688), replacing Ross's full stop with a comma.

3 *Judges* 14.18, *Theognis* 582, etc.

Aristotle generally agrees with Plato. Kouremenos (pp. 30–33) discusses its interpretation in terms of the doctrine of *Ph.* 7.2.

Notes

On 260b8–10, here *a.i.i*, the reduction of material attributes to rarity and density, Simplicius (1266.24–28) states that heavy, hard and cold are dense and their opposites rare, speculating that paleness and sweetness are rare, since they similarly seem to be ‘separative’ of corresponding perceptions.

On 260b13–15, here *b*, claiming change of size presupposes change of place, Apostle (p. 377 n. 6) remarks that this means that the proper place of what changes size must itself change; alternatively it might mean that some material constituent arrives or departs. Wagner (p. 688) cites also *Ph.* 4.4, 211a14–17 and 4.6, 213b5.

Ch. 7, 260b15–19: (B.III) Argument from the Forms of Priority, Introduction

260b15

Moreover from the following point too it will be clear to those who consider it, that transportation is first (among movements). For what is first can be spoken of in many ways in the case of movement too, just as in other cases. For something is called prior if, when it is not, the others are not either, but it will be (even) without the others; and something is called prior in time, and something prior in respect of substantiality.

Analysis

This passage states (1) that something may be prior in three ways (supplied), since (1.a) it can be prior in nature, (1.b) in time and (1.c) in substantiality (260b16–19) – and (2) locomotion is prior to the other changes in all three ways (supplied: see 260b15–261a23).

Commentary

Here 2 is the conclusion supported by the following sequence, with Arguments *B.III.1* for the priority of locomotion in nature (260b19–29), *B.III.2* for its priority in time (260b29–261a12), and *B.III.3* for priority in substantiality (261a13–23), containing two separate supporting sub-arguments, (3.I) from natural teleology (261a13–19) and (3.II) from internal invariability (261a20–23).

As Graham (1999, p. 124) notes πρότερον (*proteron*, ‘prior’) is the comparative of which πρῶτον (*prōton*, ‘first’ or ‘primary’) is in Greek the superlative;

see McKirahan (trans. of Simplicius, p. 163 n. 140) on the assimilation of *prōton* (which Aristotle uses at 260b16) to the meaning of *proteron*. Simplicius (1268.7–1269.5) lists the senses of ‘prior’ distinguished in *Categories* 12 and *Metaph.* 5.11, remarking that not all are relevant here (cf. Alexander fr. 711 Rashed); cf. also *Metaph.* 7.1, 1028a29–b2 (arguing that substance is prior to other categories in account, knowledge and time), *Metaph.* 9.8 (arguing that actuality is prior to potentiality in account, time and substance, and insofar as eternal actualities are prior to generated things) and generally Cleary, and Peramatzis.

Note that the first sense of priority listed (1.a), “when it is not, the others are not either, but it will be ⟨even⟩ without the others”, is here called “priority in nature” for convenience of reference only. It is not so denominated in the text, although at *Metaph.* 5.11, 1019a2–4 this sense is called “priority in nature and substantiality”, and at *Cat.* 11, 14a30–35 priority in “sequence of being”; Todd (trans. of Themistius, pp. 147–148 n. 759) notes this means being a necessary condition. Simplicius (1267.36, cf. 1269.10–12) asserts Aristotle thinks this sense really is priority in nature, claiming that, contrary to the *Metaphysics* article, he here distinguishes this from priority in substantiality; yet that claim is terminologically unjustified: having distinguished between this first sense and something else he here calls “priority in respect of substantiality” (260b19, here 1.c), Aristotle below explains the latter, stating “what is subsequent in generation is prior in nature” (261a14; cf. similarly *Cat.* 11, 14b3–5), and calling it “what has to a greater extent achieved its nature” (a18–19); cf. Ross (p. 718), commenting on the appeal at *Ph.* 8.9, 265a22–24 to the priority of movement in a circle in each of nature, account and time. The ambiguity in Aristotle’s usage turns on the difference between nature in the sense of cosmic and causal order, and nature in the sense of actual form as end.

Ch. 7, 260b19–29: (B.III.1) Priority in Nature of Locomotion

As a result, since there must be movement continuously, yet it could be continuously by being either continuous or sequential, but more so continuous movement, and it is better that it be continuous than sequential, and ⟨since⟩ we always suppose that what is better takes place in nature if it is possible, and that it is possible for it to be continuous (but this will be proven subsequently; for now let it be assumed), and that this can be no other movement than transportation, then transportation must be the first kind of movement. For there is no necessity that what is transported is either increased or altered, nor indeed that it is generated or destroyed,

260b20

b25

but none of these can be if there is no continuous movement, which what first incites movement incites.

Analysis

Aristotle argues that locomotion is prior in nature to other changes (260b25–26), because (a) what is prior in nature is that without which the things it is prior to will not be, while it may be without them (see 260b17–19 above); and (b) no other changes can occur at all unless there is locomotion first (supplied), because (b.i) it is preferable to think there is a (single) continuous movement (260b21), since (b.i.i) there must continuously be movement (260b19–20); while (b.i.ii) continuity of movement might occur either by there being a continuous movement, or sequential movements (without intermission) (260b20–21); but (b.i.iii) continuous movement (incited by the first mover) is better than sequential movements (260b21–22); and (b.i.iv) we always assume what is better to occur in nature, if it is possible (260b22–23); while (b.i.v) we can assume what will be proven later, that it is possible for (some) movement to be continuous (260a23–24; proven *Ph.* 8.8) – and again (b.ii) we can assume that no other form of movement except locomotion can be continuous (260b24–25; proven 261a28–b26 with *Ph.* 8.8); and (b.iii) no other changes can occur at all if there is no continuous change incited by the first mover (260b28–29) – whereas (c) there is no necessity for what is in locomotion to be increased or altered, or generated or destroyed (260b26–28).

Commentary

Graham (1999, pp. 134–136) represents this argument with his [1]–[5] corresponding to *b.i.i–b.i.v* here, his [6] roughly to *b.i*, but overlooking the point that this (260b21) specifies a movement responsible for continuity of all movement, so that in conjunction with not only 260b25, here *b.ii*, the claim that only locomotion is continuous, but also 260b28–29, here *b.iii*, that other changes depend upon the first continuous change, it implies that all other changes depend on locomotion (thus here *b*, supplied). Yet Graham only conjoins his [6], as above, with his [7], here *b.ii*, that only locomotion is continuous (260b25), to produce his [8], the rather weak claim that there is locomotion in the cosmos, also without correlate in the text. Graham does supply, corresponding with *b*, his [10], but as an additional requirement, not recognising that it is supported as above, and claiming wrongly that it is unsubstantiated.

Wagner (p. 689) mistakenly thinks Aristotle here appeals to priority ‘in substantiality’ (as at 260b19, i.e. as an end), misunderstanding the references to what is better (b21, b22, here *b.i.iii* and *b.i.iv*), and then complains he does not see how 260b15–19 (distinguishing the kinds of priority: see *a* and *b* here),

and 260b26–29, here *b.iii* and *c*, support 260b19–26 (which he treats as a complete argument that locomotion is the best kind of movement because it is continuous: see rather *b* and support); thus he treats b26–29 as a separate argument from priority in nature (b18–19: i.e. sequence of being). The ancient commentators might well have confused him. Simplicius (1269.15–35) is imprecise, seeming to claim that there are two distinct arguments to the conclusion here, a first that the first movement is everlasting, continuous, and so locomotion (not corresponding closely with the text and not appealing to priority in nature as defined), and a second (thus *καί*, 1269.23) inferring directly from 260b20–24, here *b.i.i–b.i.v*, and the claim that the principle of things moved is the self-mover and of this what is unmoved (again, not in the text), somehow that locomotion fits the definition of priority in nature (quoting 260b26–29).

Again, Philoponus (897.15–898.1) treats 260b19–25, here *b.i* with support and *b.ii*, as part of a proof that only locomotion is everlastingly continuous, separate from a proof that it is prior to other movements, because it is their necessary condition, here *b*, supplied, which he derives from the argument of 260a26–b7, here *B.I* above, that locomotion is a physical precondition for other movements, together with 260b26–28, here *c*, denying other movements are necessary for locomotion. (Lettinck, p. 597, possibly following Ibn Rushd, *LC* 397H8, I1–2, in the same error, mistakenly thinks Philoponus, 897.14–15, states that this is a proof of priority in time, but Philoponus' *καί* means that the everlasting continuity of locomotion is also appealed to in the argument for priority in time, *B.III.2* below, at 260b29–30, 261a1–7).

Simplicius and Philoponus may be misled because Alexander (fr. 712 Rashed) notes that the present argument effectively shows that whichever movement is continuous is, as such, the first: this is implied at 260b28–29, here *b.iii*; cf. b24–28, here *b.ii* and *c*, with the overall conclusion; generally cf. 260a21–26 and Ch. 6, 259a13–20 and b22–28. Nevertheless this does not illuminate its logical structure. The paraphrase by Aquinas (8.1091), following the order of the text, does not elaborate on the structure.

Note

Simplicius (1269.31) explains 260b21–22, here *b.i.iii*, claiming that continuous movement is better than sequential movements, as due to the unity of a continuous movement, in contrast to the plurality of sequential movements (cf. *Ph.* 8.6, 259a8–12).

Ch. 7, 260b29–261a12: (B.III.2) Priority in Time of Locomotion

260b30 *Moreover it must be first in time. For it is possible for everlasting things to be moved only with this movement. Yet (someone might object that) transportation in the case of any one whatsoever of those things which have generation must be the last kind of movement. For after being generated first there is alteration and growth, and transportation is then a movement of things that have been completed. But a different thing moved in respect of transportation must be prior, which will also be responsible for the generation of the things that come to be, not something that comes to be, as what generates is prior to what is generated, since generation would (then) seem to be the first kind of movement for this reason, that the thing at hand must first come to be. But as it is, this is so in the case of any one of the things that come to be, but something prior to the things that come to be must be moved, itself a being and not what comes to be, and something different prior to this. But since it is impossible that generation is first (for then everything moved would be perishable), it is clear that none of the sequential movements is prior. I call sequential growth, then alteration and shrinkage and destruction. For all of these are subsequent to generation, so that if not even generation is prior to transportation, nor is any of the other changes.*

261a1

a5

a10

Introductory Note

Aristotle argues that locomotion is prior in time to all other changes, responding to a potential objection that generation precedes locomotion in time (260b30–261a5), with the argument that universally a prior locomotion precedes any generation (261a5–9). Cornford (1934, p. 358 n. c) notes that the objector is thinking primarily of plants and animals. The argumentative structure is clearest if we formulate the objection and response, each with their own reasoning, among five primary considerations (*a–e*, not strictly all premisses).

Analysis

Aristotle argues that locomotion is primary in time (260b29, 261a12), because (*a*) everlasting things can only be moved with locomotion (260b29–30; cf. *Ph.* 8.8); while (*b*) the movement primary in time must belong to everlasting things (supplied); although (*c*) locomotion is last of all movements in generated things (260b30–32), because (*c.i*) after generation comes first alteration, then growth, and finally locomotion (260b32–33; cf. 261a3–5); and (*c.ii*) before their generation the parent is in locomotion, but it too is first generated (supplied: cf. 261a2–3) – nevertheless (*d*) generation is only prior in time to locomotion

individually, not universally (261a5, a7–8, cf. a11–12), since (*d.i*) if generation were the first movement, all moved things would be generated and perishable (261a8–9); but (*d.ii*) not all moved things are generated and perishable (proven *Ph.* 8.6, 259b32–260a19), because (*d.ii.i*) there must be a prior cause of generation moved with locomotion but not generation, and another such prior to this (261a1–2, a6–7) – while (*e*) none of the sequential movements (growth, alteration, shrinkage, destruction) is prior in time to locomotion (261a9–11, a12), since (*e.i*) all sequential movements are subsequent in time to generation (261a11); but (*e.ii*) generation is not prior to locomotion (261a11–12, cf. 261a1–2, a6–7).

Commentary

Here *a* and *b* represent Simplicius' syllogistic formalisation (1270.4–7; cf. Philoponus 898.2–4), by which Simplicius says that initially Aristotle 'potentially' (δυνάμει) proves locomotion is prior in time at 260b29–30 (before the opponent's objection), observing that the unstated premiss, here *b*, is obvious. Graham (1999, pp. 127–128) complains that, in the response to the objection (261a5–7), the implication that cosmic causes of generation are prior in time is not explicit, and Ibn Bājja (220.13–222.17, cited in Lettinck, p. 626) apparently mistakes the objection for Aristotle's doctrine, that generation precedes locomotion in time, interpreting the locomotion of everlasting causes as only prior in nature, but it is self-evident that what is everlasting is prior in time to any generated individual (cf. Philoponus, 898.4–7, and Aquinas, 8.1092), while 260b29–30, here *a*, associates everlasting locomotion with priority in time, justifying Simplicius' supplied premise. Simplicius (1271.1–8, cf. 1270.17–37) thinks there are two independent arguments in the response to the objection, one from the need for a cosmic cause of generation, and a second from the fact that not everything is generated and destroyed, but the reason for the latter is just the former.

Notes

In 261a2–3, the whole phrase “not something that comes to be” (οὐ γιγνώμενον) is misunderstood by Ross (pp. 709–710) following Simplicius (1270.23–24, 34–37) and Philoponus (900.2–6), and cf. also Apostle (trans., and p. 327 n. 13), to describe the parent (“what generates”, τὸ γεννήσαν) as not coming to be just when it functions *qua* parent. The sentence makes more sense if (removing Ross's comma after γιγνώμενον) we take “as what generates is prior to what is generated” as modifying only the non-negated γιγνώμενον, and the negative as negating the whole expression including the reference to the parent, to indicate that the kind of cause Aristotle means is precisely not the parent, since that *would* mean that generation preceded locomotion; instead, Aristotle means the

sun in what precedes (261a1–2: “a different thing moved in respect of transportation must be prior, which will also be responsible for the generation of the things that come to be”); cf. correctly Alexander (fr. 714 Rashed) and Philoponus (899.22–28). Graham (1999, p. 127, cf. trans.) follows Ross in the misinterpretation, and then he is wrong to question ἐπεὶ (‘since’, 261a3), which introduces the right reason for why, if the parent were the only cause of generation, generation would precede locomotion. This is not, *contra* Graham, a new objection, but an extension of the original objection’s principle to the case of the parent, so as (in the response to the objection) to deny the parent is the relevant kind of cause, which is only the sun, *qua* ungenerated, annually traversing the ecliptic, and prior to that the sphere of the fixed stars rotating daily (cf. 261a7).

At 261a10–11, here *e*, as Philoponus (900.11–15) notes, despite Aristotle’s “..., then ...” (ἐἴτ(α)), he is not giving an order of priority, since growth depends on alteration (260a29–30).

At 261a11, here *e.i.*, claiming generation is prior to growth and alteration, Graham (1999, p. 128) argues that this is only circumstantially true of newborn babies, and growth and alteration occur in the womb; by contrast Aristotle clearly assumes that any given subject of growth and alteration, as such, must first come to be.

Ch. 7, 261a13–23: (B.III.3) Priority in Substantiality of Locomotion

261a13 *In general, what is coming to be evidently lacks its completion and is on its way towards its principle, so that what is later in generation is prior in nature. But transportation belongs last to all things in generation. For this reason some living things are completely unmoved through lack, as are plants and many kinds of animals,⁴ while it occurs in those which attain completion. As a result, if transportation belongs to a greater degree to those which have obtained their nature to a greater degree, this kind of movement also is first in relation to the others in substantiality, both because of this and because what is moved in being transported in comparison with other movements departs least from its substance. In respect of this kind of movement alone nothing changes from being, in the way that when something is altered it is changed in respect of its*

a15

a20

4 See Note on 261a15–17 following (p. 214).

quality, and when it is increased and decreased it changes in respect of its quantity.

Introductory Note

Aristotle states the conclusion here (261a19–20), that locomotion is prior to other movements in substantiality. For the nomenclature see *Commentary* on *Ch. 7, 260b15–19: Argument (B.III) from the forms of priority, introduction* (pp. 206–207), and cf. here in the same sense “prior in nature” (261a14). For this he gives two separate sub-arguments, (I) from natural teleology (261a13–19), and more briefly (II) from internal invariability (261a20–23).

Analysis

By *Sub-argument (I) from natural teleology*, (*I.a*) locomotion is relatively more characteristic of things relatively more complete in nature (261a18–19), because (*I.a.i*) while some living things, such as plants and some kinds of animals, are completely immobile through lack, locomotion occurs in kinds that reach completion (261a15–17), since (*I.a.i.i*) what is subsequent in generation is prior in nature (261a14; cf. *Metaph.* 9.8, 1050a4–5), because (*I.a.i.i.i*) in general what is generated is evidently incomplete, and on its way towards a principle (261a13–14) – while (*I.a.i.ii*) locomotion occurs in everything generated, where it does, as a feature of completion (261a14–15).

Commentary on Sub-argument I

Simplicius (1271.29–32, 1272.7–10) wrongly asserts that 261a14–15, here *I.a.i.ii*, is supported by what follows it, 261a15–17, here *I.a.i*; the latter is introduced with “for this reason” (διό, 261a15), indicating rather that this is an inference from what precedes. Again, Simplicius (1272.14–19) apparently treats 261a18–20 as an independent argument, despite its introduction by ‘as a result’ (ὥστ(ε), 261a18). The protasis within this result clause, here the conclusion *I.a*, follows naturally from the earlier claim misrelated by Simplicius (261a15–17), that only incomplete animals lack locomotion, and while apparently an independent empirical truth (from Aristotle’s perspective), as mentioned he indicates he infers it from what precedes, and it follows from the conjunction of 261a14 and a14–15, here *I.a.i.i* and *I.a.i.ii*. The apodosis in the result clause (261a19–20) is clearly the single conclusion of the whole *Argument B.III.3* from priority in substantiality, including, as Aristotle indicates (“both because of this and because ...” 261a20) also of the following independent *Sub-argument II* from internal invariability (for *Analysis* see below). Aquinas (8.1094) gives substantially this account of the first argument, although imprecise on the logical relation between 261a14–15 and a15–17.

Notes

On 261a15–17, here *I.a.i*, comparing complete and incomplete organisms, see Ross (p. 710) and Graham (1999, p. 128) for Aristotle's accounts of zoophytes (marine animals without locomotion).

On 261a18–19, here *I.a*, assigning locomotion to more complete living things, Graham (1999, p. 128) refers to *de An.* 2.3 for the hierarchy of capacities of living beings: nutrition, perception (with a hierarchy among the senses from touch to sight), imagination and locomotion, and thought. Cf. also *MA* Ch. 5, 700a31–32, to be read in accordance with the present chapter (so Nussbaum, pp. 328–329, with further parallels from the biological works).

Analysis and Commentary

By *Sub-argument II from internal invariability*, (*II.a*) what changes place changes less significantly than in other movements (261a20–21), because (*II.a.i*) by locomotion alone it does not change from its being, whereas something altered is changed in quality, and if increased or decreased, in quantity (261a21–23).

Aquinas (8.1095) usefully explains what Aristotle means by “depart[ing] less from its substance” (261b20) than in other movements, as that nothing is removed from the subject, which remains internally invariant. Wagner (p. 690) nevertheless complains that since place is a category of being alongside quality and quantity, it is a ‘exaggeration’ within Aristotle's own ontology to say locomotion does not involve change in being; thus the argument is dialectical. Graham (1999, pp. 128–129) notes that in modern philosophy by contrast place is treated as a relational property, and so locomotion involves only change in relations (although for Aristotle place is relative to the absolute limits of the cosmos; cf. Graham, 1999, p. 130); Graham also notes Aristotle could have included generation and destruction in this argument as yet more radically substantial changes.

Ch. 7, 261a23–26: (*B.IV*) Argument from Self-movement

261a23

a25

And it is particularly clear that what moves itself moves itself independently with this movement in particular, movement in place; and indeed we say this is a principle of things moved and inciting movement, and first among what is moved, that which moves itself.

Analysis

Arguing again dialectically here for the priority of locomotion, Aristotle reasons (*a*) that what moves itself independently changes place (261a23–25; cf. *Ph.* 8.2, 253a14–15; 8.6, 259b6–7); but (*b*) we say what moves itself is a principle of things in movement inciting movement, and first among things moved (261a25–26; cf. *Ph.* 8.6, 259a33–b1).

Commentary

Graham (p. 129) notes that the claim that locomotion is the only independent movement of self-movers (261a23–25, here *a*), has only previously been established for animals; but this is not problematic given that Aristotle restricts self-movement to perishable things, i.e., animals (cf. e.g., *Ph.* 8.6, 259b31, and Blyth, 2015). Thus similarly Ross's unquantified formalisation (p. 710: locomotion is the movement of self-movers; self-movers are the first things moved; thus locomotion is the first movement) is misleadingly vague, since the cosmic first mover only moves the first body externally; rather, self-movers (animals) are invoked here because containing their own first mover they exemplify the primary movement.

Alexander (fr. 718 Rashed), followed by Simplicius (1272.28–38), treats this argument as compatible with priority in all three senses from Argument *III* above (260b15–261a23), in nature, time and substantiality. Seeck (p. 152 and cf. p. 149) thinks the treatment of a self-mover here as a first mover contradicts Aristotle's account of the unmoved mover, apparently assuming Aristotle refers to the Platonic world-soul, since Seeck thinks Chs. 2, 4 and 6 have shown that animals are not self-movers, and notes there is no explicit link back to 261a20–23 immediately preceding, which does refer to animals; as a result Seeck regards this passage, or at least 261a25–26 as a later insertion in the text. Contrary to Graham, Simplicius and Seeck, Aristotle might mean at 261a25–26, here *b*, no more than that the incidental movements of inanimate terrestrial things derive from the movements of living things.

Ch. 7, 261a27–31: (C.1) Procedural Preliminary

Well then, it is evident from this that transportation is the first kind of movement. But now it must be shown what kind of transportation is first. Jointly, by this procedure, what both now and previously was assumed will be clear, that it is possible for some movement to be continuous and everlasting.

261a27

a30

Analysis

Aristotle here first draws the overall conclusion from the preceding part of the chapter, (1) that locomotion is the first kind of movement (261a27–28, cf. 260b5–6). Then he makes two further statements, (2) that he will now investigate which kind of locomotion is first (261a28, cf. 260a22–23, 260b6–7), and (3) simultaneously show that one kind (the first), can be continuous and everlasting (261a29–30, cf. 260a21–22), because (3.a) so far, that this is possible has been merely assumed to be the case (261a28–29).

Commentary

Philoponus (901.17–25) explains that having demonstrated that locomotion is prior to other movements, Aristotle will show rotation is the first kind, because it alone can be continuous, given that he has shown that it would be better so if possible, after immediately (in the rest of Ch. 7) showing no others except locomotion can be continuous. Aquinas (8.1097), who regards this as a major juncture in the text, really differs only in noting that the proof that rotation is first does not come until Ch. 9 (265a13–b16), after the demonstration in Ch. 8 that it can be continuous. He refers back (loc. cit.: *id quod nunc paulo supra diximus ... ut supra ostensum est*: cf. 8.1086 in fin.) to 260a23–26 for a previous demonstration that the first movement is continuous, but see rather *Ph.* 8.6, 259a13–20. Simplicius (1273.16–27) differs in several respects: firstly he thinks the text here continues with the previous inquiry, limited now to the question which kind of locomotion is first, and this, he says, will be found to be continuous—taking Aristotle at his word (261a27–31), rather than reporting what he does (although at 1273.27–33 Simplicius acknowledges that Aristotle proceeds by demonstrating that locomotion, and in particular rotation, alone is continuous); secondly Simplicius denies that previously the continuity of movement was demonstrated; and thirdly he says the relevant division among species of locomotion is between rectilinear, circular and the combination of the two. (Possibly similarly Aquinas, loc. cit., refers to *Ph.* 7.4, 248a18–b6, and otherwise mistakenly to the distinction in *Ph.* 7.2, 243a16–244b2 among different ways a mover causes locomotion, as his editor and translator think).

Note

Where in 261a28–29, here 3.a, Aristotle states that the possibility of continuous movement previously was assumed, Ross (p. 710) followed by Wagner (p. 691) notes this was most recently at 260b23, suggesting also *Ph.* 8.3, 253a28–29, but perhaps rather 8.6, 259a16–20 is meant (so Cornford, p. 362 n. a). Todd (trans. of Themistius, p. 148 n. 766) suggests a reference to *Ph.* 8.1–2 generally, but Aristotle has since introduced the idea of a single continuous movement. That

rotation alone can be everlastingly continuous is demonstrated in *Ph.* 8.8; the rest of 8.7 prepares by arguing that no other movement besides locomotion can be continuous.

Ch. 7, 261a31–36: (C.2) Non-continuity of Other Movements and Changes, Introduction

Now from the following it is clear that it is possible for none of the other movements to be continuous. For all <these> movements and changes are from one opposite to the other;⁵ as, for instance, for generation and destruction what is and what is not are boundaries, and for alteration the contrary affections, and for growth and shrinkage magnitude and smallness, or completion and incompleteness of magnitude.

Analysis

Aristotle argues in the rest of the chapter for the conclusion that no movements or changes except locomotion can be continuous (261a31–32), since (a) all the others are between opposites (261a32–33; cf. *Ph.* 6.10, 241a26–28), because (a.i) the boundaries of generation and destruction are what is and what is not (261a34; cf. *Ph.* 6.10, 241a28–30); and (a.ii) the boundaries of alteration are the contrary affections (261a34–35; cf. *Ph.* 6.10, 241a30–32); while (a.iii) the boundaries of growth and shrinkage are size and smallness, or completeness and incompleteness of size (261a35–36; cf. *Ph.* 5.2, 226a29–32, 6.10, 241a32–b2) – but (b) change (or movement) between opposites cannot be continuous (supplied: see below, 261b6–7, b13–14).

Commentary

The major premiss, here *b*, is subsequently supported by two distinct sub-arguments, (I) from the impossibility of co-incident opposites (261a36–b22), and, more briefly, (II) from the general similarity of nature (261b22–26).

Graham (1999, pp. 130–131) questions whether Aristotle means locomotions to be included within the scope of *a*, that all movements and changes are between opposites (261a32–33). His doctrine elsewhere is that locomotion is between the opposites left and right, up and down or behind and in front (see Graham's references); Aquinas (8.1098, 6.881) appeals to *Ph.* 6.10, 241b2–3 to show that these are not always limits (but cf. b3–12). The cases that follow as

⁵ See *Note* below on 261a32–33 (p. 218).

justification (261a34–36, here *a.i–a.iii*) ignore locomotion. Inductive generalisation is possible, although, as 261b6–7 and b13–14 (cf. here *b*) imply, some locomotion must be excluded, or else the argument would show there is no continuous movement at all. Thus Ross (p. 710) indicates that at 261a32–33, as here in *a*, ‘other’ is to be understood from 261a31. Graham (loc. cit.) though suggests that only locomotion not between opposites (i.e. rotation) is excluded, and seems right to say that 261b1–2 (below) means to signal the exclusion of what moves continuously in the same direction (by rotating) from the subject of the argument.

Note

First in 261a32–33, here *a* (and subsequently in this chapter), ‘contrary’ (vel sim.), not ‘opposite’ (as previously) translates ἐναντίος (*enantios*) and cognates, with ‘opposite’ and cognates reserved for forms of ἀντίκειμαι (*antikeimai*), since at 261b7–9 below, Aristotle explicitly mentions his distinction between (i) *changes* (μεταβολαί, *metabolai*) between contradictories (κατ’ ἀντιφασιν, *kat’ antiphasin*), and (ii) *movements* (κινήσεις, *kinēseis*) between contrary states (see *Ph.* 5.1, 224b28–225b9). Contraries are terms at opposite extremes, whereas contradictories are any two logically inconsistent terms (thus contraries are contradictories, but not necessarily *vice versa*); ‘opposite’ is a vague term, which can be used of either contrary or contradictory (see *Cat.* 10, *Int.* 6, *Metaph.* 5.10). Note also that Aristotle does sometimes refer to movements as changes, the latter being the genus, while movements are that species where change is between contraries. Cf. Wagner (p. 691) and see further Graham (1999, pp. 129–130) on the contraries in locomotion.

Note on Ch. 7, 261a36–b22: (C.2.I) From the Impossibility of Co-incident Opposites

Aristotle argues here that change (repeated movement) between opposites cannot be continuous (261b6–7, b13–14, Premiss *b* in the previous passage). This follows below from (*b.i*), that neither a movement (from one contrary to the other) nor a change (into a contradictory state) can be followed immediately by a movement or change to the opposite state (supplied; cf. 261b2–3, b3–4, b7, b12–13, b24–25). Aristotle’s argument for this physical doctrine involves three steps, (1) demonstrating that what is moved comes to rest in the contrary state (stated 261b2–3, proven 261a46–b3), (2) demonstrating that the same happens in *change* into an *opposite* state, as in generation and destruction (stated 261b3–4, b7, proven 261b3–7), and (3) responding to three objections,

the first implied, (3.a) that generation and destruction are not contraries, and after (3.b) the response, a second objection (3.c), that no rest is necessary between destruction and generation, answered (3.d), and a third objection (3.e) that the argument assumes the same thing will be contrary to many, which is impossible, with (3.f) Aristotle's answer (261b7–22). Aristotle's method of dealing with potential objections creates logical redundancy in the *Analysis*, but adds clarity.

Graham (1999, pp. 130–131) provides analysis bearing little relation to the text, not indicating that Aristotle treats movements separately from generation and destruction (here Argument 1 = 261a36–b3, and 2 = 261b3–7), while Graham's sub-argument that movement to an opposite takes a finite time is not in the text. Simplicius (1273.35–37) incorrectly claims that Aristotle in Argument 1 deals with movements and changes together, then separately in 2 with changes (i.e., generation and destruction); rather 1 is explicitly limited to contraries and rest (as Simplicius admits, 1274.2–4, and cf. correctly 1275.4–8). Aquinas (8.1098) divides the arguments as here.

Ch. 7, 261a36–b3: (C.2.I.1) The Case of Movements (*kinēseis*)

Movements⁶ towards contraries are contrary movements. What is not always moved with a particular movement, but is previously, must previously be at rest. So it is evident that what changes will be at rest in the contrary condition. 261b1

Analysis

The conclusion here, (1) that what is moved in a movement rests in the state contrary to its starting state (261b2–3), follows because (1.a), what is not continuously moved with one particular movement, but previously existed, must previously have been at rest (261b1–2), since (1.a.i) movements into contraries are contrary movements (261a36–b1; cf. *Ph.* 5.5, 229a32–b10); while (1.a.ii) if what is moved were not at rest, it would have been undergoing both contrary movements at the point of changeover between them (supplied); and (1.a.iii) it is not possible for contrary movements to occur together (supplied: cf. 261b20–22; also 261b5–6 in C.2.I.2 following).

6 The word κινήσεις must be supplied here from 261a33, given Aristotle's general doctrine that only κινήσεις, not μεταβολαί ('changes') are between contraries (τὰ ἐναντία, b1); see the *Note* above on 261a32–33 (p. 218).

Commentary

The justification presented for 261b1–2, here *1.a*, follows Ross (p. 710) and partly Simplicius (1274.33–35), but see below. Wicksteed (trans.) takes the claim at 261b1–2 to be simply that what existed before undergoing a given movement must then have been free of it, but this is uninformative, and Aristotle clearly means the subject was not undergoing the opposite movement. Waterlow (1982, p. 150 with n. 42) regards it as a key fallacy in Aristotle's thinking here that he thinks termini of movements require rest. Graham (1999, pp. 131–132) agrees with this, but not with the explanation by Ross and Simplicius, on the ground that change of direction can in fact be instantaneous; yet that is irrelevant to the interpretation, since Aristotle argues in *Ph.* 8.8 that it is not so, and moreover the parallelism between the cases of movement and change, explicitly insisted upon at 261b7–22 (Argument 3 below), and with specific reference to the point at issue (261b9, b15, b20–22), makes the reason implied unambiguous. Note 261a36–b1, here *1.a.i*, is treated as support for what follows, although 261b1–2, here *1.a*, is introduced by δέ, not any inferential particle. Both the demands of logic and the implied parallelism with the following case regarding generation and destruction below require this; an early transcription error is possible (cf. E¹'s change of οὖν to δέ at the following 261b2), although more probably Aristotle has not been logically precise. Aquinas (8.1098) conjoins the implication of 261a36–b1, that movements to contraries cannot co-exist, with b1–2, supporting the latter inadequately with the claim that everything is at rest or in movement, to produce 261b2–3, here *1*, but again, it is not clear what the former contributes in that case.

Since Simplicius' overall account of this argument (1274.14–1275.5) is too complex to discuss, I present an analysis with indications of partial correspondence with that above. Among other things, the increase in supplied premisses here tells against it: (**1*) movements between contraries cannot be continuous (1275.4–5, supplied), because (**1.a*) changes into contraries are contrary changes (1274.14–15 = 261a36–b1, above *1.a.i*); while (**1.b*) one continuous movement cannot arise from opposite ones (1274.16–17, supplied), because (**1.b.i*) becoming one opposite is inconsistent with becoming the other (1274.17–28, supplied, above *1.a.iii*) – but (**1.c*) (if movement between contraries is not one,) there must be a rest in between (1274.29–30 = 261b2–3?, above *1?*), because (**1.c.i*) what is not continuously moved with one particular movement, but previously existed, must previously have been at rest (1274.30–33 = 261b1–2, above *1.a*), since (**1.c.i.i*) if it were not at rest, it would have been undergoing both contrary movements at the point of changeover between them (1274.33–36, supplied, above *1.a.ii*); and (**1.c.i.ii*) something is not (e.g.) white until after having become white, and only thereafter begins changing into black (1274.36–39,

supplied), since (**i.c.i.ii.i*) it cannot both be at and not be at the limit at the same time (1274.39–1275.4, supplied).

Philoponus (902.6–11) supports the claim there must be rest between opposed movements (cf. 261b1–2, here *i.a*, and support), inferring that since something undergoing one movement cannot be undergoing the opposite, there must be a start to the opposite, but a start to a movement is a boundary between movement and rest; for the latter cf. 261b15–22, in *C.2.I.3* below, but anticipation is unlikely. Again, the possible objection invoking instantaneous change of direction is not faced until Ch. 8, 262b22–263a2; note several arguments against continuously reversing rectilinear locomotion in Ch. 8 also apply against other changes, two even using them as examples (264b1–9, pp. 269–274).

Ch. 7, 261b3–7: (*C.2.I.2*) The Case of Changes (*metabolai*)

And it is similar in the case of changes; for generation and destruction are opposed simply, and a particular instance to a particular instance. As a result, if it is impossible to change jointly with the opposed changes, change will not be continuous, but there will be some time between them.

261b3
b5

Analysis

Here Aristotle provides a separate argument for the case of changes, since according to his doctrine in *Ph.* 5.1, 224b35–225b5 these are not necessarily processes between contrary end states (A and B) but opposites in the sense of contradictory states (A and not A), e.g. being and not being. Thus here he argues (2) that, similarly to the case for movements (*κινήσεις*, *kinēseis*), there will be time between changes (*μεταβολαί*, *metabolai*) into opposite states (261b3–4, b7), because (2.a) changes into opposites are opposite changes (supplied: cf. 261a36–b1 above, and *Ph.* 5.5, 229b10–14), since (2.a.i) generation and destruction are opposed simply, and a particular instance to a particular instance (261b4–5) – while (2.b) it is impossible to undergo opposite changes at the same time (261b5–6).

Commentary

Aquinas (8.1099) represents the argument as above, adding the implication there could not be continuous generation without an interval when destruction of what was generated occurs. Simplicius (1275.8–23) apparently contradicts himself, claiming that before being born a man must be temporarily at rest as the seed, but then that there is no rest, strictly, in the state of non-being

before generation (and also that because what will be generated does not yet exist before generation but what is destroyed must previously exist, what was to be cannot be destroyed, which is not true of a seed).

Ch. 7, 261b7–22: (C.2.I.3) Responses to Objections

261b7 *For it makes no difference whether the contradictory changes are con-*
traries or not contraries, so long as it is impossible for them to be present
 b10 *together in the same thing (for that is not at all relevant to the argument),*
nor if it is not necessary to rest in the contradictory condition and change
is not something contrary to rest (for perhaps what is not does not rest,
while destruction is into what is not), but only whether there is time in
 b15 *between. For thus the change is not continuous. For neither is the contra-*
dictory relevant in the previous cases, but that they cannot occur together is.
But there is no need to be concerned that the same thing will be con-
trary to many things, such as movement to stopping and to movement in
the contrary direction, but only to grasp this, that somehow the contrary
 b20 *movement is opposed to both the movement and to rest, just as the equal*
and the measured are opposed to what exceeds and what is exceeded, and
that it is possible neither for opposed movements nor opposed changes to
occur together.

See above, the *Note on Ch. 7, 261a36–b22: (C.2.I) from the impossibility of co-*
incident opposites (pp. 218–219), for the overall structure of objections and
 responses here, which I present as parallel primary but opposed claims.

Analysis

The *First Objection*, to the claim (2 above), that there will be time between changes (μεταβολαί, *metabolai*) into opposite states (261b3–4, b7), is not explicitly stated and must be inferred from Aristotle's response. It would run (3.a) that generation and destruction as changes are not similar to movements, as in 2 above (supplied), because (3.a.i) they are not contrary processes (supplied: see 261b7–10, b14–15, b20–22, i.e. 3.b below), since (3.a.i.i) their end states are not contraries (supplied). Aristotle responds (3.b) that it makes no difference whether the contradictory changes are contraries or not, but only that they cannot be present in the same thing together (261b7–9, b15, b20–22), since (3.b.i) whether or not they are contraries is irrelevant to the argument in the case of either changes or movements (261b9–10, b14–15).

The *Second Objection* is (3.c) that there need be no rest between destruc-

tion and generation (supplied), since (3.c.i) presumably what is not does not rest (261b11–12); and (3.c.ii) destruction is into what is not (261b12). Aristotle responds (3.d) that it is irrelevant if something need not rest in the contradictory state, and change is not the contrary of rest, only that time must occur between changes into opposite states (261b10–11, b13).

The *Third Objection* is (3.e) that the argument assumes one thing is contrary to many things, (a given movement contrary both to standing still and also to the contrary movement), but this is impossible (261b15–17); Aristotle replies (3.f) that we must accept the fact that a given movement is somehow opposed to both rest and the contrary movement (261b17–19), since (3.f.i) similarly what is equal and measured is opposed both to what exceeds and to what is exceeded (261b19–20).

Commentary

The organisation of objections and responses generally accords with Aquinas (8.1100–1102). Graham (1999, pp. 132–133) identifies two main dissimilarities between movements and other changes that Aristotle is concerned to show are irrelevant to the argument: (i) changes are between contradictories not contraries (implied at 261b7–9; cf. here 3.a), and (ii) one contradictory state is non-being, and so rest is impossible there (261b10–13; see here 3.c), and cf. *Ph.* 5.6, 230a7–18; Graham then observes that Aristotle responds to (i) that contradictories cannot exist together any more than contraries (261b9, b15, b20–22, here 3.b), and to (ii) that even if there is no rest, time must still occur in between changes (261b13, here 3.d).

The third objection follows the principle Aristotle inherited from Plato that one thing only has one contrary (see Graham, 1999, p. 134, for references, and cf. *Metaph.* 10.6), which Aristotle must deny here (261b15–20, here 3.f), asserting that a movement is contrary to both the opposite movement and to rest. Alexander's explanation (ap. Simplicius 1276.36–1277.14), that otherwise if a movement was only opposed to rest the subject would be able to undergo both otherwise opposed movements together, fails to explain the importance of the opposition to rest; Cornford (1934, intro. to Ch. 7, p. 355) explains the point here that a given movement must not only cease before its opposite begins, but also before the intermission without movement begins. An Aristotelian explanation for 261b17–20 is that *qua* movement, a given movement is opposed to rest as its generic contradictory, but *qua* one of a pair of specific contrary movements, a given movement is opposed to the contrary movement as its contrary (cf. Philoponus, 904.23–27 = 841.29–33, distinguishing, as each contradictory to something, both the privation and the opposite form).

Notes

Simplicius (1275.41–1276.3) explains 261b7–9, cf. b15, b20–22, here 3.b, as that what makes it impossible for contrary movements to occur together is not their contrariety, strictly speaking, but that contraries are instances of contradictory things. McKirahan (trans. of Simplicius, p. 165 n. 194) discusses precise references for Simplicius' appeal to *De interpretatione* here.

On 261b11–12, the support for objection 3.c, Ross (p. 710) provides references for Aristotle restricting rest (ἡρεμία, *ēremia*) to things strictly capable of movement (between contraries, excluding generation and destruction).

On 261b17–19, here 3.f, Simplicius (1276.4–15) notes that at *Ph.* 5.6, 229b23–31 (thus McKirahan, trans. of Simplicius, p. 165 n. 195; but see also esp. 229b31–230a7, b10–21 and generally *passim*) Aristotle treats rest at the terminus *a quo* as opposed, as a privation, to a movement away, explaining how a movement is contrary both to rest and a contrary movement. Simplicius (1276.24–25) adds as a further instance of more than one opposite (cf. 261b19–20, here 3.f.i), the case of the vices (both the excess and deficiency of a given virtue, on Aristotle's theory).

Ch. 7, 261b22–26: (C.2.II) Argument from the General Similarity of Nature

261b22 *Moreover in the case of generation and destruction it would actually seem to be completely absurd, if what was coming to be immediately had to be destroyed and did not last for any time at all. Consequently the other*
 b25 *kinds of change can gain a confirmation from this, for it is natural that the situation is similar in all of them.*

On the context and role of this argument see the *Analysis* under Ch. 7, 261a31–36: (C.2) *non-continuity of other movements and changes, introduction* (above, p. 217).

Analysis

Here Aristotle provides a second reason for the uniqueness of locomotion as potentially continuous (see further Ch. 8 following), that no change is immediately followed by its opposite change (261b24–25), because (a) it would be absurd, if something generated immediately had to perish without lasting for any time (261b22–24); and (b) it is natural for the situation to be similar in all changes (261b25–26).

Commentary

Graham (1999, p. 134) does not seem to recognise this as a distinct argument, although he does note, following Philoponus (905.1–7, cf. 842.1–4), that Aristotle's natural teleology supports 261b22–24, here *a*; Philoponus' explanation is that nature's aim in bringing something to be is that it be (for a time). Simplicius (1277.19–26) discusses the argument as a hypothetical syllogism, but the text does not seem to bear this out. He also suggests (1277.26–29) that the generalisation (261b25–26, here *b*), might be *a fortiori*: if generation and destruction, as contradictories, are discontinuous, this will be all the more so in the case of change between contraries. Again, the text does not support this, but rather an inference by way of the homogeneity of nature.

The Unique Continuity of Rotation

Introduction to Chapter 8

Simplicius (1277.36–1278.3) explains Aristotle's purpose here as, after proving (in Ch. 7) that no other kind of change can be everlastingly continuous (so that if any is, it must be locomotion), he now shows which kind of locomotion can be (cf. similarly Philoponus 905.10–14 and Aquinas 8.1104). Aristotle identifies this with the rotation around the earth of spheres carrying the astronomical bodies (the stars, sun, moon and visible planets).

Graham (1999, p. 135), following Ballew, traces the cosmological primacy of the sphere from Parmenides *via* Plato. He overlooks (i) the importance of Pythagoreanism in this regard (both its general interest in geometrical solids, and Philolaus' system), (ii) the empirical ground for the primacy of the sphere, in the apparent diurnal rotation of the fixed stars (cf. also *Cael.* 2.4, esp. 287a12–31), and (iii) the usefulness and fertility of the assumption in contemporary and later ancient astronomy, from Eudoxus to Ptolemy (and still in Copernicus' system). Even the ellipse, given priority by Kepler, can be constructed from circular rotation around a centre travelling on a limited straight line with appropriate straight and angular velocities. Newton, rather, is perhaps the first to found early modern cosmology on a quite different kind of mathematical basis. Nevertheless Aristotle's arguments here are not cosmological, but based on his general physical principles: his analyses of movement, space and time. Most references to other books of the *Physics* in this commentary are to Bks 5–6, closely followed by Bk 3, *Cael.*, *Metaph.* 12 and then *Ph.* 7; references to *Ph.* 1–2, 4, *GC* and *Metaph.* 9 are roughly half as frequent. This provides some indication of the mode of thought here, and the unity of Bks 5–6 and 8.

The chapter's overall strategy is to demonstrate (Part A) that only rotation is continuous (261b27–265a2, constituting most of Ch. 8) then (Part B) briefly to reject the alternative Presocratic view that there is universal flux (265a2–10). Within Part A, Aristotle argues for five general conclusions: (1) if any kind of locomotion is continuous, either circular or rectilinear movement must be (261b28–31); (2) rectilinear locomotion (even by reversing) cannot continue without limit (261b34–264b9, the main task); (3) circular locomotion can do so (264b9–21); (4) but partial circular movement cannot (264b21–28); and (5) all non-locomotive forms of change similarly cannot (264b8–265a2). The key

Section 2 here, concerned with rectilinear locomotion, is divided into two general categories of argumentation, Arguments *I–II* from Aristotle's own physical principles (261b32–264a8), and *III–VI*, four dialectical arguments (264a8–b9), although the difference in kind of reasoning is less than the distinction suggests. During the former Aristotle digresses, establishing two corollaries (263a3–264a6). Corollary 1 solves Zeno's first paradox, 'the dichotomy', the argument that movement is impossible because a body moved any given distance in a finite time must traverse an infinity, since space is infinitely divisible: see here 263a4–b9 with *Commentary* (pp. 250–255), and cf. Ross (pp. 71–75, 83–85), and Sorabji (1983, pp. 321–330). Corollary 2 solves a problem generated by Aristotle's theory, about the status of a change's limit point (263b9–264a6).

Characteristic of Aristotle's theory, in contrast to modern theories of the infinite beginning with Dedekind and Cantor, is that a cutting point of a line only exists potentially, not actually, unless identified as actual by an event or act of thought; and more generally that the infinite only exists potentially, not as actual (for instance as a set of points on a line). Thus in Aristotle's theory, for a body described solely as moving from A to B, since movement is continuous, no point between A and B is actual except the limits themselves. This enables Aristotle to argue, for the reasons he gives here, that in treating the termini A and B as actual, the body must actually occupy them and so stop before reversing, and so such movement cannot be continuous.

Ch. 8, 261b27–31: (A.1) Reduction of All Locomotion to Straight or Circular

Let us now establish that there can be a particular <movement> that is unlimited, since it is one and continuous, and this is movement in a circle. For everything transported is moved either in a circle or a straight line or a combination of these, so that if either of the former two is not continuous, nor can that composed of both be so.

8, 261b27
b30

This passage first presents the chapter's overall conclusion, specifically of its long main argument, then the first of five coordinated supporting arguments: see further the chapter's *Introduction*, immediately preceding.

Analysis

Aristotle here concludes (A) that only circular locomotion can be one and continuous without limit (261b27–28, cf. 265a7–12, and *Ph.* 6.10, 241b18–20). He then begins the argument for this, first establishing (A.1) that, if any kind

of locomotion is continuous, either circular or rectilinear movement must be (supplied), since (1.a) if either rotation or rectilinear movement cannot be continuous, neither can a combination (261b29–31), because (1.a.i) a combination is subject to the limitations of each ingredient (supplied); and (1.a.ii) locomotion is either circular, rectilinear, or a combination (261b28–29; cf. Ch. 9, 265a13–16, and *Cael.* 1.3, 270b29–31).

Commentary

As Cornford (1934, p. 369 n. c) says, the implication here is that since rectilinear locomotion will be shown not to be continuous, no combined form of locomotion is. Aristotle's claim is imprecise about whether he means all curves (i) must be composed of straight and circular segments, or (ii) can be constructed by sections of three-dimensional bodies composed of straight and circular elements, or more generally (iii) by relations between points moving in straight lines and circles. Aquinas (8.1105) is probably wrong to explain this only in the first sense, with the example of movement along a chord and returning around the related arc of a circle. That incidentally raises the question why such movements are not continuous, Aristotle's answer being presumably that as composed of distinct parts with individual termini, they must cease at the termini before continuing; see A.2 below (261b31–264b9, pp. 229–274) on rest at a terminus.

For the belief that all other kinds of lines can be produced from combinations of straight and circular (261b28–29, here 1.a.ii), Cornford (1934, p. 369 n. b) followed by Heath (p. 147) compares Plato *Parmenides* 145b, which is not entirely explicit. Philoponus (905.16–19, cf. 21–36) and Wicksteed (p. 368 n. b) suggest Aristotle means a spiral as the combination of a straight line and circle, but Wicksteed also discusses various plane curves derivable this way. Graham (1999, p. 135) notes there are kinds of curve irreducible mathematically to combinations of circular and straight paths, including the parabolic paths Newtonian physics predicts for certain bodies in gravitational fields. That this is so for a projectile not escaping the earth's gravity is not clear to ordinary observation, and when curves were treated mathematically as geometrical epiphenomena, before Descartes, there was no adequate theoretical reason to recognise such curves as a distinct mathematical possibility.

Note

Aristotle indicates that 261b29–31, here 1.a, is a conclusion, but manifestly it does not follow from b28–29, here 1.a.ii, alone; accordingly I have supplied the principle 1.a.i that a combination is subject to the limitations of each of its ingredients; cf. Heath (p. 147), and Simplicius (1278.7–13), expressing the point

in terms of participation, although not dealing well with the objection that the combination might nevertheless derive continuity by participation in the continuous ingredient alone. Philoponus (907.1–4) gives no reason.

Note on Ch. 8, 261b31–264b9: (A.2) Discontinuity of Locomotion in a Straight Line

This long section contains the chapter's main achievement; cf. *Ph.* 8.7, 261a36–b22, arguing that non-locomotory changes must be discontinuous, since there must be a break between changes in opposite directions.

The conclusion A.2, that rectilinear locomotion must be limited and discontinuous, is stated initially (261b31–32; cf. 262a12–13, 263a2–3 and 264a33–b1), and then supported (A.2.1) by two physical arguments that what reverses direction is not moved continuously, (A.2.1.I) from contrary movements (261b33–262a12) and (A.2.1.II) by analysis of the physics of stopping (262a12–263a3). Aristotle then (A.2.2) establishes two corollaries (263a4–264a6), discussed below. Thereafter A.2 is further supported (A.2.3) with four dialectical arguments from general assumptions (for clarity individually numbered continuously with the physical arguments), (A.2.3.III) from contrary movements (264a9–21), (A.2.3.IV) from the opposition of rest to movement (264a21–b1), (A.2.3.V) from contrary states (264b1–6), and (A.2.3.VI) from the distinction of contrary extreme points (264b6–9).

Ch. 8, 261b31–33: (A.2.1) The Physical Arguments for A.2, Introduction

It is clear that what is transported in a straight line, which is limited, is not transported continuously; for it turns back. 261b31

Analysis

Aristotle first presents the general conclusion of the arguments to follow, (A.2) that locomotion in a straight line must be limited and discontinuous (261b31–32). The immediate support for this follows eventually at the end of Section A.2, that (a) the arguments specific to the subject matter demonstrate this (264a6–8), because (a.i) what is moved in a straight line must reverse direction (if it does not permanently stop) (261b32–33), since (a.i.i) no straight line is unlimited (supplied: see *Ph.* 3.7, 207b3–5, b15–21; 3.8, 208a21–22; cf. 3.5); and (a.i.ii) it is impossible to travel along a limited path for an unlimited time (supplied: see

Ph. 6.2, 233a32–b15) – while (*a.ii*) what reverses direction on a straight line is not moved continuously (supplied). In what follows immediately the two physical Arguments *I* and *II* (i.e., “arguments specific to the subject matter”, 264a7) support *a.ii*.

Commentary

On the structure of this immediate overall argument for *A.2* see similarly Philoponus (907.7–13). Simplicius’ explanation (1301.12–15) of Aristotle’s description of the following two arguments as ‘specific to the subject’ (οἰκεῖοις, 264a7) is that both contrariety (of directions and movements), in Argument *I*, and the continuity of magnitudes, in *II*, are factors intrinsic to rectilinear locomotion. See further *Ch. 8*, 264a7–9: (*A.2.3*) *introduction to the dialectical arguments* below (pp. 263–264).

Drozdek (pp. 59–60 with n. 2) argues from mathematics that one possibility Aristotle overlooks here undermines his argument, that of a body travelling on a limited straight line with a continuously exponentially changing rate of deceleration, so it takes an infinite time to reach the end (cf. *a.i.ii* above with ref.). Aristotle would presumably reject the relevance of such possibilities on cosmological grounds, indicating that continuity is really only a necessary condition of the first movement for him. Philoponus (902.34–38) suggests a counterexample thereafter found in the Arabic tradition (Abū l-Faraj 905.2–11, Ibn Bājjā 224.9–228.2, cited in Lettinck, respectively pp. 585–586 and 629–630), of a moving body striking a bigger body moving in the opposite direction and being carried back along with it, since there could be no rest unless the larger body was temporarily also stopped, although Philoponus admits this might happen imperceptibly.

Ch. 8, 261b33–262a12: (*A.2.1.I*) First Argument from Contrary Movements

Note there is also a second argument from contrary movements below, Argument *A.2.3.III* (264a9–21), among the dialectical arguments.

- 261b33 *What turns back in a straight line is moved with contrary movements;*
 for movement in place upward is contrary to movement downward, and
 b35 *movement forwards to movement backwards, and movement to the left*
 to movement to the right, since these are the contraries of place. What
 262a1 *a unified continuous movement is has previously been defined as that of*
 one thing in one time and within what is undifferentiated in form (since

there are three things: what is moved, as a man or a god is, and when
 (it is moved), as the time, and third that in which; this is either place or
 affection or form or size). But the contraries differ in form and are not one
 thing, and those of place are the previously stated differentiations. It is an
 indication that the movement from A to B is contrary to that from B to A,
 that they halt and stop each other if they happen together. And similarly
 in a circle, as the movement from A to B is contrary to the movement
 from A to C (for they halt (each other), even if they are continuous and
 no turning-back takes place, because of the contraries cancelling and
 preventing each other); by contrast sideways movement is not contrary
 to movement upward.

Analysis

Aristotle argues that what reverses direction on a straight line is not moved continuously (supplied), because (a) a unified continuous movement is by definition (i) that of one thing moved, (ii) in one time, and (iii) all in one specific distinct form of movement (261b36–262a2; see *Ph.* 5.4, 227b21–228a3, and cf. 228a20–b11); while (b) contrary movements are not one but different in form (262a5); and (c) what reverses direction on a straight line is moved with contrary movements (261b33–34), because (c.i) locomotion upwards is contrary to downwards, forwards to backwards, and towards the left is contrary to towards the right (261b34–36, 262a5–6), since (c.i.i) up and down, in front and behind, and left and right are respectively the contraries of place (261b36; cf. *Ph.* 3.5, 205b31–34); and (c.i.ii) movements between contrary termini are contrary movements (supplied: see *Ph.* 5.5, 229a32–b10, b21–22 and *passim*), because (c.i.ii.i) the movement from A to B is contrary to that from B to A (on a straight line) (262a6–7), since (c.i.ii.i.i) they stop and halt each other if they coincide (262a7–8) – and (c.i.ii.ii) similarly, movements from the same point in opposite directions on a circle are contrary (262a8–10), since (c.i.ii.ii.i) they halt each other even if they are continuous and there is no reversal of direction (262a10–11), because (c.i.ii.ii.i.i) they cancel each other out and prevent each other (262a11–12) – while (c.i.ii.iii) by contrast, sideways movement is not contrary to movement upwards (262a12).

Commentary

Graham (1999, pp. 135–136) illustrates well by examples the implications of the definition of a single movement. Yet his summary, as that a movement and its reverse cannot be continuous because their defining termini are in the reverse order, is slightly misleading: contrariety, not order, forms the middle term. Bowin (pp. 341–342) mistakenly denies the argument is complete or shows why

a reversing movement is not continuous, explaining it as merely preparing for Argument A.2.3.III below (264a9–21).

Simplicius (1278.17–21) and Philoponus (907.12–18) seem clearly mistaken to derive the conclusion here from only *c*, that what reverses direction is subject to contrary movements (261b33–34), with support, and that movements between opposite extremes must stop, for which see rather the following Argument A.2.1.II, at 262a12–19 (pp. 234–235). Simplicius (1278.30–33) regards the definition of a single movement at 261b36–262a2, here *a*, as introducing a different proof (straight-line movements are between contraries and so themselves contrary, not one in form, and so not continuous), and cf. similarly Philoponus (907.18–21). Nevertheless subsequently Simplicius (1279.11–16, and cf. similarly Aquinas 8.1106), allows that the definition may be part of one single argument whereby 261b32–36 supports the claim that straight-line movement involves contrary movements (here *c*), and 261b36–262a5 that contrary movements are not one (cf. 262a5, here *b*), but the latter denies formal, not numerical, unity, and so is tautological, and the definition (26ab36–262a2) is a separate premiss, here *a*. Like Simplicius, Ross (p. 711) takes the argument to be complete at 262a6: what turns back is not moved continuously, since continuous movement must be all of one form, whereas contrary movements differ in form (because, Ross adds, their termini are contraries); but, as Aquinas (8.1107) recognises, 262a6–12 gives a reason why movements between contrary termini are contrary movements.

White (pp. 105–106) suggests that the effect of the current series of arguments is to ‘correct’ Aristotle’s definition of a single movement by ‘refining’ criterion (ii), that it occur in a single time, with the requirement that a single non-eternal movement must be “punctuated ... by periods of *stasis*”, so as to exclude parts of movements as single movements. Yet the current proof actually deduces the ‘refinement’ from the preceding criteria together with some essential attributes of rectilinear locomotion.

Notes

With 261b36, here *c.i.i*, the specification of the contraries of place, cf. *Ph.* 3.5, 205b31–34, and see Ross (ad loc., pp. 553–554) and Graham (1999, p. 130) on *Ph.* 8.7, 261a32–b26 for discussion of these with further references.

At 262a2–5, following *a*, his definition of a single continuous movement, Aristotle gives examples of the three requirements: (i) the one thing moved might be, for instance, a man, or a god; (ii) the one time is that when it is moved; (iii) the generic form of movement is that either in place, affection (or form), or size (cf. *Ph.* 5.4 cited in the *Analysis*).

In the argument of 262a6–12, here the support for *c.i.ii* (the supplied premiss that movements between contraries are contrary movements), Ross (pp. 711–712), following Simplicius (1279.32–1280.8), and cf. similarly Graham (1999, pp. 136–137), takes the prevention of contrary movements to which Aristotle appeals to be mutual physical obstruction by the moved bodies. Nevertheless Aristotle's words are consistent with the effect of a man walking backwards on a boat at the same speed at which the boat drifts forwards: the man's two movements "halt and stop" each other; thus also Apostle (p. 329 n. 9), and apparently McKirahan (trans. of Simplicius, p. 166 n. 222), noting that while Aristotle speaks of the movements interacting, Simplicius does of two moving bodies. Kouremenos (pp. 117–118) compares *Cael.* 1.4, 271a29–30, concerning opposed movements cancelling each other out, not colliding bodies, yet Kouremenos follows Simplicius and Graham. In the circular example (262a8–12, here *c.i.ii.ii* and support), where B and C are on opposite sides, with A between on the perimeter, Ross must extrapolate a subsequent collision opposite A not implied in the text (following Simplicius 1280.3); the case is better taken by analogy with that of the straight line as described here. The final point (262a12, here *c.i.ii.iii*) is then that movements at right angles do not mutually cancel out (whereas on Ross's interpretation, the bodies might indeed all the same collide in some cases, ending their original movements); Philoponus (842.19–28) describes a resultant angular movement in a rectangular space, but without relevance to the circular case. Wicksteed (p. 370 n. d) interprets movements at right angles as directional components by analysis of the movement around a circumference, implausibly since for Aristotle circular movement is generically distinct from rectilinear movement (cf. *Ph.* 7.4); the conception is more probably a comparison of one temporally distinct part of the circular movement with a later part, when a given point on the body is apparently moving at right angles to its former apparent direction (a comparison only of tangential, not component, motions). Yet Ross apparently thinks there is a contrast between the two resultant straight line movements (along the chords) from a point on a circumference (A above) to each of two points (B and C) a quarter way round it in each direction as termini of a diameter; but again this would involve equivalences of *actual* movements (assimilation of circular to straight) that Aristotle would reject, since there is no *apparent* movement along the chords.

Ch. 8, 262a12–19: (A.2.1.II) Argument by Analysis of Stopping, Introduction

262a13 *But it is particularly obvious that it is impossible for movement on a straight line to be continuous, because what turns back must stop, not only on a straight line, but also if it is transported with circular movement.*
 a15 *For it is not the same thing to be transported in circles and with circular movement.¹ For it is possible at one time for it to continue being moved, and at another, when coming to the same point from which it set out, to turn back again. The confirmation that it must stop depends not only on perception, but also on reason.*

Analysis

This introduces the second physical argument for the conclusion, that what reverses direction must stop, whether moved on a straight or circular path, and thus is not moved continuously (262a12–15; cf. b25–28, 263a1–2). Aristotle argues for this (a) that being moved *on a circular path* is not the same as being moved *in circles* (262a15–16), since (a.i) it is possible to reverse direction on a circular path, when one circuit has been completed (262a16–17); (b) that perception confirms what reverses direction must stop (262a17–18); and (c) that reason also confirms it (262a19).

This introduces the following proof by analysis of the physics of stopping, constituting an argument from the nature of a point (262a19–263a3). Thus c above, that reason confirms what reverses direction must stop, follows by an argument containing two sections, *II.1*, on the role of a midpoint (262a19–b22), concluding that if something moved treats a point on a line as an actual midpoint it must stop there before being moved again (262a23–25, and repeatedly); and *II.2*, on the requirement to stop at an endpoint (262b22–263a3), inferring from the principles advanced in *II.1*, that something reversing direction treats the extremity of its path just like an actual midpoint, not a potential one, and must stop before reversing (262b25–26, 263a1–2).

Commentary

Both Simplicius (1280.19–22) and Aquinas (8.1108, cf. 1106) identify this as a second argument that what reverses direction on a straight line cannot be moved

1 In order to clarify this distinction, in this passage alone I have used ‘in circles’ for Aristotle’s *κύκλῳ* (dative of manner), in contrast to *κύκλῳ* (internal accusative: ‘on a circular path’, ‘with circular movement’); elsewhere I have used the more literal ‘in a circle’ for the former.

continuously. Graham (1999, pp. 137–138; cf. his analysis, p. 188) apparently fails to recognise this, although noting rightly that, following Argument II, 263a4–264a6 is a digression (see below, pp. 250–263). Yet Graham also apparently denies that anything in 262a12–b22 contributes to the argument (contrast the *Analysis* here, and Section II.1 following).

Note

On 262a17–18, here *b*, Apostle (p. 330 n. 13), followed by Drozdek (p. 60), questions whether perception does confirm that what reverses direction must stop.

Ch. 8, 262a19–31: (II.1) The Role of a Midpoint, Introduction

The following is the principle: given three things, beginning, intermediate and end, the intermediate is both ⟨beginning and end⟩ in relation to each of the other two, and one in number but two in account. Moreover what is potentially and what is actually are different, so that any point at all of those between the extremities of the straight line is potentially the intermediate, but actually is not, unless ⟨what is moved⟩ divides it here, and having come to a stop again begins to be moved. And that is how the intermediate becomes beginning and end, beginning of the subsequent movement, and end of the first one (and I mean as if A, which is transported,² stops at B, and again is transported to C). But when it is transported continuously it is neither possible for A to have come to be nor to have ceased to be at point B, but only to be ⟨there⟩ in the ‘now’, but in no time except in the whole of which the ‘now’ is the division.

Analysis

There are two corresponding conclusions here; 1 is that if something moved treats a point on a line as an actual midpoint it must stop there before beginning to be moved again (262a23–25, cf. a26–28, b3, b5–7, b25–26, 263a1–2) because (1.a) when a midpoint is treated as actual either by something moved or in thought, it divides the line in two (262a24; cf. b5–7, 263a23–26), since (1.a.i) there are three factors in a line, the beginning, midpoint and end (262a19–20); and (1.a.ii) an actual midpoint, while one in number, is two in account, an end

2 I.e. ‘A’ now names the body that was previously at point A (262a7).

in relation to the beginning, and a beginning in relation to the end (262a20–21, a25–26).

Conclusion 2 is that if something is moved continuously along a straight line, any point it traverses is potentially a midpoint, but not actually so (262a22–23), since (2.a) potential and actual are different (262a21–22); and (2.b) if something is moved continuously, it has not come to be nor ceased to be at any midpoint, but is only there in the ‘now’, and in no time except that whole of which the ‘now’ is a dividing (262a27–31, cf. b7–8, b17–20, b21–22).

Commentary

The last point (262a27–31, here 2.b), is the basis of Aristotle’s distinctive position. It is supported next by two separate arguments, (*II.1.I*) by exclusion of rest during continuous movement (262a31–b8), and (*II.1.II*) by comparison of equal movements (262b8–22).

As Apostle (p. 330 n. 15) remarks, by μέσον (*meson*, e.g., 262a20: ‘midpoint’, ‘middle’) Aristotle means any point between beginning and end. Wicksteed’s account (pp. 372–373 n. a) of Aristotle’s doctrine here overlooks his subsequent statement that a line is divided not only by a moving object stopping at a midpoint, but also by the mind conceiving of the object as at the point (262b6–7). Moreover Wicksteed’s description of a line’s two parts as continuous by contiguity is both confused and incorrect: there are no contiguous (adjacent) points on a line, nor is the same point (belonging to both halves) contiguous with itself.

Aristotle treats physically stopping and thinking of the body as being at a point as equivalent, apparently because the subject of his explanation is *the object as conceived in accordance with the phenomena*, in this case, that of an actual point (cf. Wieland, p. 160.) Graham (1999, pp. 139–140) describes this in terms of a “thought experiment”, and Simplicius (1283.35–39) explains that while the point remains numerically one because it is in fact indivisible, it is used as two equally by the body that stops and then starts again there, and by the person conceiving of the line as divided. In thinking of the body as at the point, someone must think of the point as actual and so of the body as stopped there (see further on 262a31–b8 immediately following, pp. 238–241).

Graham (pp. 138–139) notes that Aristotle’s account of any point on a line (other than a beginning or end) as only potentially present unless functioning as a beginning and/or end, is fundamentally different from modern set theory, where a line is conceived as constituted from a densely infinite set of actual points, such that (ST 1) of any two points one is prior and one posterior, (ST 2) between any two points there are more, and (ST 3), if the line is cut, the point

at the cut belongs to one of the two mutually exclusive subsets, as first or last, while in the other there is no corresponding point respectively either last or else first.

Drozdek (pp. 61–62) argues that Aristotle “seems to commit a logical fallacy”, asserting he infers here from the claim (i) that being at a point involves resting, to the claim (ii) that being there makes the point actual, whereas below in applying his analysis to an endpoint he infers from (ii) to (i). But the *Analysis* here does not substantiate Drozdek’s account of the present direction of argument. After repeating the present conclusion that the body stops (ἐπιστάν, 262a24) at 262b6–7 (ἀνάγκη στῆναι), Aristotle states the reason explicitly, that the latter is treated as two (διὰ τὸ δύο ποιεῖν; cf. b25–26) which is a control on interpreting a25–26 here as 1.a.ii. Here since non-division implies the point is not actual (a23–24), its actuality implies division, and this because its actuality divides the line and makes it the end of each half (a20–21), so when Aristotle adds “and after stopping there it begins to move again” (a24–25), he makes an inference *from* the actuality of the point where a body is said to be, by way of the fact that it acts as two points, to its stopping.

The argument for stopping at an actual point is given in greater detail below in 262b22–263a3, here *II.2*, on which see the *Commentary*.

Notes

Simplicius (1281.23–36) takes Aristotle at 262a20, here 1.a.ii, where he uses the expression πρὸς ἑκάτερον ἄμφω ἐστίν (“... is both ⟨beginning and end⟩ in relation to each of the other two”) as literally meaning that the midpoint is “both in relation to each (extreme)”. This means, as McKirahan (trans. of Simplicius, p. 167 n. 227) notes, when movement reverses at each extreme, since the latter functions as both beginning and end, the midpoint is at different times both end and beginning in relation to each extreme taken individually, a reading which Simplicius contrasts with the less complicated interpretation adopted here, that he attributes to Alexander, and cf. Philoponus (842.31–32). Simplicius seems confused, since if the midpoint is actual there is no single movement between the original extremes, and so the situation is not one of regularly reversed movements between them; again, on Simplicius’ view the midpoint would have four functions, not two.

At 262a30, here 2.b, it might seem better to use the expression “during no time” instead of “in no time” for ἐν χρόνῳ ... οὐδενί, except Aristotle uses the same preposition, ἐν (*en*), also with ‘now’, but ‘now’ has no duration, which is precisely what distinguishes it from a time or a whole here. I have regularly hereafter represented Aristotle’s ἐν + temporal term as ‘in’ to reflect this usage

(he frequently prefers this expression in the present chapter when he might have used a dative of time at which). What Aristotle means at 262a27–31 is that A is at B at some instant ('now') within any whole of which 'now' is a division. See similarly Sorabji (1983, pp. 85, 413), but this has significant implications. The principle is that 'now' is not a material part of time, only a division or limit (*Ph.* 4.13, 222a10–20). This might seem a truism, and we might be tempted to treat his *ἐν* as equivalent to 'at', not 'in'; but this overlooks exactly what Aristotle here rejects, which the modern treatment of points and infinitesimals helps to obscure: because we feel (for better or worse) comfortable in conceiving of an instant as implicitly *part* of time, 'at' with a temporal term for us is understood either as, or by analogy with, duration, and we feel justified in thinking of a moving body as in turn 'at' each of the positions it passes through. But Aristotle is seriously opposed to this view. When he says here that the body is only there in the 'now', and the 'now' only divides time, he really does think of it as *never really being there*, since it would have to be gone (not there) *as soon as* it is there (which he denies we can coherently assert; Sorabji, loc. cit., does not really acknowledge this deeper consideration). Accordingly, for Aristotle, the instant, and equally the corresponding point on a path, are only potentially there, since the body *might* then stop there. Graham (1999, p. 140) expresses this as that, if a body moves continuously from A to C on a line, and B is between A and C, then "B plays no defining role in the motion from A to C"; more importantly, B plays no *material* part in the movement either. As Aquinas (8.1109, in fin.) puts it, the body's being at some point on the path stands to the whole movement as the 'now' stands to the time the movement takes (i.e., in each case, *it is not part of it*); cf. Alexander (fr. 735 Rashed) and Simplicius (1282.28–29, 1283.20–21), although less insightfully, in the first case relating the point to the line, not the body's being there to the movement.

Ch. 8, 262a31–b8: (*II.1.I*) Argument by Exclusion of Rest in Continuous Movement

Aristotle here supports as a conclusion, the key claim immediately above, that something moved continuously has neither come to be nor ceased to be at any midpoint (262a27–31, b7–8, cf. b17–20, b21–22). The argument here responds to a potential objection.

- 262a32 (*But if someone takes the position that it has come to be and ceased to be*
 ⟨at a point⟩, then A, which is transported, will always be stopping; for
 262b1 *it is impossible for A jointly to have come to be at B and to have ceased*

to be *⟨there⟩*. Thus these would be in different points of time. Thus there will be time in between. As a result, A will rest at B, and similarly at the other points, since the same account applies to them all. So when A, which is transported, uses B as an intermediate, and an end and a beginning, it must stop, owing to its making them two, just as if someone were in fact to think *⟨of it there⟩*.) But it has ceased to be *⟨only⟩* at point A,³ the beginning, and it has come to be *⟨only⟩* at C, when it finishes and stops. b5

Analysis

The objection here is (1) that something moved has come to be and ceased to be at each point in its path (262a31–32); and the response is (2) that this cannot be so (262b7–8), because, by *reductio ad absurdum*, (2.a) in that case it would have to be always beginning to rest (262a32), since (2.a.i) if some A, while being moved, has come to be and has ceased to be at any point B, it will stop and rest there (262b3, b5–6), because (2.a.i.i) if A has come to be and has ceased to be at B, it must spend time there (262b2–3), since (2.a.i.i.i) it uses B as two points, an end and a beginning (262b5–7); and (2.a.i.i.ii) these two points cannot coincide in time (supplied), because (2.a.i.i.ii.i) the instant at which A has come to be at B is different from that in which it has ceased to be there (262b2), since (2.a.i.i.ii.i.i) it is impossible for A to have come to be and to have ceased to be at point B at once (262a32–b1) – while (2.a.ii) A would also rest at every other point on its path (262b3–4), because (2.a.ii.i) the same argument applies to every point (262b4) – and (2.b) it is impossible for something to be at rest throughout a movement (supplied).

Commentary

This adapts Zeno's third paradox, that a flying arrow would be stationary at every moment, and since that is impossible, movement must be impossible (*Ph.* 6.9, 239b30–33).

In Bowin's account (p. 322) of this argument, his (3) corresponds to the self-contradictory result, here 2.a, that (if A comes to be and ceases to be at any point B) it would have to be always beginning to rest (262a32), but Bowin treats this as if it were a coherent premiss, following 'somehow' from his (2), the assumption that A comes to be and ceases to be at B without resting (not in the text); moreover this overlooks the immediately preceding 262a27–31

3 As Graham (p. 140) notes, Aristotle now uses 'A' not for the body but for the starting point on the line; although immediately hereafter again for the body.

and following a32–b1, here 2.a.i.i.i.i.i, both contradicting his (2); thus Bowen's reading of the text is impossible, since 'for' (γάρ, b1) indicates clearly that 2.a follows, at least indirectly, from 2.a.i.i.i.i.i.

Drozdek (p. 60 n. 3) thinks he provides a counterexample to Aristotle's argument (that a body could not actually be at each point of its path, because it would then always be at rest), in the case where the total rest would be of finite duration, if there were a sequence of points such that the rest at each was a fraction of the last, exponentially approaching a limit sum. This is mistaken both because Aristotle would argue there could be no such complete sequence of points, and also because his argument does not depend on the points being infinite in number, and the supposed rest infinite, only on the paradox that the object would never ever be moved (even between points, since between any two points there are always others; cf. 262b3–4).

For the main discussion of Aristotle's conception see below the *Commentary* to Ch. 8, 262b22–263a3: (II.2) *on the requirement to stop at an endpoint* (esp. pp. 246–250).

Notes

Graham (1999, p. 139) says Aristotle takes 262a32–b1, here 2.a.i.i.i.i.i, stating that A cannot have come to be and ceased to be somewhere simultaneously, to be true in virtue of the aspectual implication of the Greek perfect tense used, that a previously attained state now still persists (and so has not ceased to be so); while this may be why he uses the perfect infinitives γεγονέναι and ἀπογεγονέναι (262b1), the reason he thinks it true is rather that the states these terms refer to are inconsistent, and so can only occur at different times. Apostle (p. 332 n. 26) explains the point without reference to tense: "for to arrive at H implies to rest there for some time"; cf. also Aquinas (8.1114, *adesse vel accedere*), and the aorist infinitives at Simplicius (1282.16–17, 1283.12), although perhaps these betray the latter's non-recognition that the argument rests on the incompatibility of states, not events or processes; yet Simplicius (1283.12–13) provides as a further ground for the present claim, that it is not possible both to be and not be in the same (state?) at the same time (cf. 262b27–28). Bostock (p. 173 n. 17) mistakenly claims this argument must assume there is a first moment at which the body has left the point, but the argument is general: the moment at which the body has come to be at the point must differ from any and every moment at which it has left it. See further below, the *Commentary* to Ch. 8, 262b22–263a3: (II.2) *on the requirement to stop at an endpoint* (esp. pp. 247–248).

For 262b2–3, here 2.a.i.i, that if A has come to be and has ceased to be at B, it must spend time there, Simplicius (1283.13–14) provides an additional

premiss, that there must be time between any two instants, since instants are not adjacent (for which McKirahan, trans. of Simplicius, p. 167 ns. 233–234, cites respectively *Ph.* 6.1, 231b9–10 and 4.10, 218a18–19; cf. Sorabji, 1983, pp. 73 n. 14 and 324 n. 10); this seems to identify the use of B as an end and a beginning as both occurring at instants, but in fact the beginning of a movement is not at an instant (*Ph.* 6.5, 236a13–27); cf. the *Commentary* on the following argument.

At 262b5–7, here 2.a.i.i.i, arguing that if what is moved comes to be at point B it uses it as two points, the end of one movement and the beginning of another, Aristotle adds “just as if someone were in fact to think ⟨of it there⟩”, noting the implications of conceiving of something as actually at a given point: we must think of it as stopped there, even if just for an instant, and hence as having completed one movement, and about to start another. Philoponus (843.21–26) notes the point thus becomes an end and a beginning not by nature but by its relation (σχησις) sc. to the line’s original termini. Cf. Alexander (fr. 736 Rashed) and Simplicius (1283.28–39) on the double function of the point of division, and see further above, the *Commentary* to *Ch.* 8, 262a19–31: (II.1) *the role of a midpoint, introduction* (pp. 236–237).

Ch. 8, 262b8–22: (II.1.II) Argument from Comparison of Equal Movements

For this reason that is what should also be stated in relation to the following difficulty that is involved. For if the line E ⟨indicates⟩ is equal to line G, and A is transported continuously from the extremity to C, and A is at point B jointly with D being transported from extremity G to H evenly and at the same speed as A, then D will arrive at H ahead of A at C.⁴ For what sets off and leaves earlier must arrive earlier. For A has not come to be at B and ceased to be at B jointly, because of which it is late. For if they have taken place jointly, it will not be late; but ⟨in fact⟩ it will have to stop ⟨at B⟩. Thus we should not take the position that when A came to be at B, D jointly was in movement from extremity G (for if A is going to have come to be at B, its ceasing to be ⟨there⟩ will also be possible, and not jointly), but rather it was there at a cutting of time, and not in a time. So it is impossible here to say this in the case of continuous movement, ...

4 On the implied diagram and scenario see the *Commentary* below.

Analysis

The conclusion here is that if some A is moved along line EC, then if it did not stop at point B, it was not at B in any time, but only in a cutting of time (262b20–21; cf. b8–13, b16–17, b17–19), because (a) if A is ever at point B, while D (having started at the same time) is moved along line GH of equal length to EC at a constant equal speed, then D will arrive at H before A at C (262b10–14, b16), since (a.i) what starts earlier (and travels the same distance at equal speed) must arrive earlier (262b14–15); and (a.ii) if A is at point B in any time, it must have been behind D once it departed from B (supplied), because (a.ii.i) A must stop at B, if in any time it is there (262b17), since (a.ii.i.i) A has not come to be and ceased to be at B all at once (262b15–16, b19–20; cf. 262a32–b1) – while (b) two things being moved an equal distance at the same speed having started together must arrive together (supplied).

Commentary

On the interpretation of the main claim defended here, that a moved body is only at a point *en route* at a cutting of time, with no duration (262b20–21), see the *Commentary* on Ch. 8, 262a19–31: (II.1) *the role of a midpoint, introduction* and esp. the *Note* on 262a30 (pp. 236–238). Zekl (p. 290 n. 136) mistakenly calls the cutting ('Zeitschnitt') an infinitesimal, but the cutting here, unlike an infinitesimal, has no duration whatsoever. Aristotle presents this at 262b8–9 as the solution to an ἀπορία (*aporia*, 'difficulty'), which Ross (pp. 712–713) sets out (cf. Apostle, p. 331 n. 24). See the diagrams at Wicksteed (p. 375), Ross (p. 712) or Graham (1999, p. 140). Body A travels along line EBC while D travels along line GH of equal length, and so A passes through B while D is *en route* from G to H. The problem is that if A comes to be at B, Aristotle argues, it will leave it later and so arrive at C after D arrives at H, despite the fact that their speeds and distances travelled are equal.

Aquinas (8.1113) explains the problem mistakenly as to avoid a counterfactual conclusion from the previous argument, that if a moving object comes to be at any midpoint, then it is also always at rest (261a31–b8, above II.1.I), by excluding rest during continuous movement; but the present argument faces its own absurdity, and the solution is given immediately by the *Analysis*. Aquinas (8.1112, cf. 1113–1122) also links this passage directly with the later digression (263a4–264a6; see below, pp. 250–263) as the first of three difficulties; yet the intervening passage (262b22–263a3) involves the major premiss of the overall argument from the ontology of points, that reversing movement in a straight line cannot be continuous (which Aquinas treats merely as an appendix to the solution to this problem, 8.1114). Again the *Analysis* shows the present passage independently supports the previous claim that something in continuous

movement does not come to be or cease to be at a midpoint (262a27–31, cf. b7–8, cited just above).

Notes

Graham (1999, pp. 141–142) remarks that 262b14–15, here *a.i.*, claiming what starts earlier must arrive earlier, does not apply to the case, since D has not ‘set off’ from a point corresponding to B, precisely because there is *ex hypothesi* no corresponding actual point. Yet Alexander (ap. Simplicius 1285.14–29) rightly describes such a point (at which D did not stop, in contrast to A at B) as a potential, not an actual one; but cf. Alexander (fr. 740 Rashed) incorrectly. Aquinas (8.1113) identifies the point G on GH as at the same distance from H as B is from its line’s terminus C, specifying that A arrives at B at the same time as D sets out from G (thus unless A also leaves B coincidentally, it will finish late); this is creatively effective, but he has misunderstood his Latin text (262b12/Lat. 874, ἀπὸ τῆς Ζ [= G] ἄκρας/Lat. *a Z* parallels not b11–12, ἐπὶ τῷ Β σημείῳ/Lat. *in B signo*, but b11, ἀπὸ τοῦ [E] ἄκρου/Lat. *ab extremo*); Simplicius (1285.35–1286.3) notes the potential ambiguity and explains it correctly. Philoponus (843.30–33) may have also misunderstood this, although Alexander (fr. 738 Rashed) did not, but Rashed (pp. 599–600) revives the view. Nevertheless Aristotle explicitly states that the (whole) line E (= EBC) is equal to line G (= GH) (262b10, here *a*), and that body D is being transported (φέροιτο, b12; κινεῖσθαι, b18: note aspect) from G to H when body A is at B, not that D leaves G then. Arabic philosophers reformulated the situation either with both bodies on the same line starting from opposite ends at the same time and speed, and meeting halfway in between, where one body reverses direction when it meets the first, or with the non-reversing body on a different line of equal length, implying the reversing body returns to its starting point only after the other body arrives at the same or corresponding terminus (Ibn Bājja 224.9–228.2, cited in Lettinck, p. 629, cf. p. 646; Ibn Rushd, *LC* 408B2–13; Ibn Rushd’s text of Aristotle at 407G1 = 262b11 reads “A is transported continuously from the extremity *E* to *B*, with a return to *E*”).

262b15–16, here *a.ii.i.i.*, follows Ross’s correction of the manuscripts (cf. app. crit., and Ross, p. 713); McKirahan (trans. of Simplicius, p. 167 n. 236), denying this is Simplicius’ reading, apparently mistakes Ross’s point, that Simplicius’ commentary (1285.32) does not support the lemma at 1285.31 (possibly altered to available manuscripts of Aristotle), implying ‘for’, not ‘thus’, which is required by the argument.

At 262b16–17, cf. the conclusion here, Alexander (fr. 739 Rashed) incorrectly explains “for if they have taken place jointly, it will not be late” to refer to the

two movements, but b15–16, here *a.ii.i.i*, shows it refers to body A arriving and departing from point B at the same time.

Ch. 8, 262b22–263a3: (*II.2*) On the Requirement to Stop at an Endpoint

Introductory Note

This is the second part of the proof by analysis of the physics of stopping, Argument *A.2.1.II* from the nature of a point (262a19–263a3), the second physical argument for the discontinuity of reversing rectilinear locomotion. The two physical (*I–II*), and four dialectical (*III–VI*) arguments support the claim *A.2* that such locomotion is discontinuous (261b34–264b9), the key claim among the five in the argument of Part *A*, the chapter's main section, demonstrating only rotation can be continuous. See further the general *Introduction* to the chapter (pp. 226–227). Argument *A.2.1.II* aims overall to distinguish the status of the endpoint where reversal occurs from any intermediate point a body passes through: while it is only potentially at an intermediate point, not stopping there, it must be actually at the endpoint, and so must stop before reversing. Hitherto Aristotle has established in Section *II.1* that if something moved treats a point on a line as an actual midpoint it must stop there before being moved again (262a23–25, cf. a26–27, b3, b5–6, b25–26, 263a1–2). Now he argues (*II.2*) that something reversing direction must treat the endpoint just like an actual midpoint, and so stop there.

262b22 ... but we must say so⁵ in the case of what turns back. For if the point
 H (indicates) were transported towards *D* and turning back were trans-
 ported again downward, it has used the extremity to which *D* (is applied)
 b25 as an end and a beginning, the one point as two.⁶ Thus it must stop, and it
 has not come to be at *D* and departed from *D* jointly; for it would jointly be
 there and not be there in the same 'now'. But in fact we must not propose
 (in this case) the solution previously (given for passing through an inter-
 mediate point). For it is not possible to say that the point *H* (indicates) is
 b30 at *D* in a cutting (of time), and that it has neither come to be nor ceased

5 I.e., that a body comes to be, and ceases to be, at a point at different times (see previous passage).

6 As Ross (p. 713) notes, the functional relationship between *D* and *H* has been reversed here, so that *D* represents a fixed point (i.e. *G* in the previous situation) and *H* a moving body.

to be *(there)*. For it must come to an endpoint that is actually, not potentially. So while intermediate points are potentially, this is actually, and is the end *(of the path)* from below, and the beginning *(of the path)* from above, and thus similarly of the movements. Thus what turns back on the straight line must stop. Thus it is not possible for there to be continuous movement forever on a straight line.⁷ 263a1

Aristotle states at the end the general conclusion to Section A.2, that it is not possible for rectilinear locomotion to continue forever (263a2–3), on which see the *Note on Ch. 8*, 261b31–264b9: (A.2) *discontinuity of locomotion in a straight line* (p. 229), more recently restated, in effect, in Premiss *c* of the *Analysis of A.2.1.II*, for which see above *Ch. 8*, 262a12–19: (A.2.1.II) *Argument by analysis of stopping, introduction* (pp. 234–235).

Analysis

The present argument concludes in support of this (II.2) that a body H in rectilinear locomotion must stop at a point D at which it reverses direction (262b25–26, 263a1–2), because (a) in reversing at D, H uses it as two points, the end of one movement, and the beginning of the reverse movement (262b23–25); but (b) the role of D as an end and a beginning cannot coincide in time (supplied), since (b.i) H cannot jointly ($\alpha\mu\alpha$) have come to be at D and have departed from D (262b22–23, b26–27, b30), because (b.i.i) otherwise it would jointly both be there and not be there in the same ‘now’ (262b27–28) – but (b.ii) H must have come to be and have ceased to be at D (262b30), because (b.ii.i) H cannot be at D just at a cutting of time (262b28–30), because (b.ii.i.i) H is at D actually (supplied), because (b.ii.i.i.i) while midpoints are potential points, D is an actual point (262b31–32), because (b.ii.i.i.i.i) H must move towards an actual, not just a potential, end (262b30–31); and (b.ii.i.i.i.ii) D is the end of the movement from below and the beginning of the movement from above (263a1), because (b.ii.i.i.i.i.i) D is the end of the path from below and the beginning of the path from above (262b32–263a1).

Commentary

For Aquinas’ (8.1114) treatment of this passage as an appendix to the previous argument (262b8–22) see the *Commentary* above (pp. 242–243). Bowin (pp. 330–331) claims that Aristotle here makes the assumption, his (2), that the

7 Taking $\acute{\alpha}\lambda\theta\iota\omicron\nu$ adverbially: perhaps originally $\epsilon\iota\varsigma\ \acute{\alpha}\lambda\theta\iota\omicron\nu$, and thus perhaps supporting the word order of FHJ (Ross’s Λ).

body H comes to be and departs from the endpoint D without resting; he presumably means at 262b26–27, but see here *b.i* for the function of this, deriving rather the contradictory of Bowin's (2) immediately from 262b27–28, that otherwise it would jointly both be there and not be there in the same 'now' (here *b.i.i*). Bowin also claims that from his (2) Aristotle here infers, as a *reductio* disproof of it, his (3), that G is always coming to a stop while in movement, but there is nothing related to that in the text.

The immediate conclusion *II.2* here, that a body H in rectilinear locomotion must stop at a point D at which it reverses direction (262b25–26, 263a1–2), corresponds with the conclusion above of *II.1*, that a moved body treating a midpoint as actual must stop there (262a23–25), and cf. also 262a31–b8, Argument *II.1.I*. Premiss *a* here, that in reversing at point D, H uses it as two points, the end of one movement, and the beginning of the reverse movement (262b23–25) corresponds with and summarises 262a19–21, a23–26 (Premiss *a* and support for *II.1* above), and also 262b5–7 which has an equivalent role in *II.1.I*. This confirms, as Aristotle says when he first introduces it (262a19–21 in *II.1*), that the double-function of such a point is the primary principle of his repeated argumentative pattern, along with the distinction between a potential and actual point (a21–22). Here I supply, as co-ordinate with this, *b*, that the role of D as an end and as a beginning cannot coincide in time, which follows from *b.i*, that H cannot contemporaneously have come to be at D and have departed from D (262b22–23, b26–27, b30), as correspondingly in the argument of *II.1.I* at 262a32–b2, and the logically equivalent claim in *II.1* that if something is moved continuously, it has not come to be nor ceased to be at any midpoint, but is only there in the 'now' (262a27–31, cf. b7–8, b17–20, b21–22). Finally, explicitly as the alternative case to *II.1*, where the latter claim is deduced from the second principle of the argument, the distinction between potential and actual points (262a21–23, a27–31), here Aristotle argues in *b.ii* and support, that the moving body H must occupy the endpoint D actually, and not just be there potentially, at a cutting in time (262b28–263a1).

In *II.1* above the actuality of a midpoint implicitly follows from its occupation (262a23–25) by the body, whereas here the actuality of the endpoint implies its occupation (262b28–32), and so rest. But this is a distinction merely in the direction of argumentation, not in reality: the endpoint only is an endpoint because the moving body reverses there, so that *de re* its actuality derives from the ending of a (directional) movement there, and the beginning of the opposite movement there. Thus it is from this double function of ending and beginning that Aristotle infers the point's actuality: cf. 262b23–25, here *a*, which as Aristotle says (262a19–21) is the principle of his argument.

For Aristotle the kind of being there that results, because the body is actually there, differs from that of being at a (potential) midpoint “in a cutting of time” (ἐν τομῇ χρόνου) implied at 262b20–21, which is not “in a time” (ἐν χρόνῳ), as in this case. Aristotle treats the kind of being involved in being somewhere actual as a persisting there: see especially 262b27–28, here *b.i.i.* This is presumably because, given that the actuality of the point follows from the body’s defining behaviour there, he assimilates the former to the body’s actually being there, just as in the case of the actual midpoint. But while being potentially at a point is consistent with being potentially not at that point, being actually at a point is not consistent with being actually not at that point; thus there must be one time when the body is at the end (stopped), and another when it is gone.

Wicksteed (pp. 376–377 n. c; cf. his Introduction to Ch. 8, pp. 366–368, and pp. 372–373 n. a) claims that here Aristotle allows there might be no pause at the endpoint, only an instantaneous reversal of direction, effectively because the endpoint’s being an actual end of a path in one direction is sufficient to constitute two distinct movements, towards and away from it. Yet cf. *Ph.* 6.3, 234a31–b7, denying rest at an instant; note too 262b29–30, here *b.iii.i.*, stating that the body cannot be at the endpoint only at a cutting of time (an instant) and there is both a coming to be, and a ceasing to be, there, clearly meaning these must be distinct, and so separated by time. Wicksteed’s Introduction to the chapter shows he has in mind the doctrine (263b9–264a6, see below pp. 256–263) that, with regard to the body, the temporal endpoint of the former movement belongs only to the subsequent state (and so movement), which he regards not as digressing (as below here), but defending simultaneity of arrival and departure; nevertheless the present passage seems explicit enough to make that irrelevant. Graham’s analysis (pp. 141–142) treats the argument as aiming to prove that time must be spent at the endpoint, although criticising it on the grounds that it does not adequately rule out the logical possibility of instantaneous reversal; cf. Sorabji (1983, pp. 73, 324).

Sorabji (1976, p. 85) claims that Aristotle’s argument here, and in *II.1.I* above (262a31–b8), requires, following the instant when the body is first present at an actual mid- or endpoint, the assumption of a first instant of ceasing to be there, which would contradict the arguments of *Ph.* 6.5 showing there is no first time in which something is changing (236a13–27), no first changed part (236a27–35), and, for divisible attributes, no first change (236b8–17). Yet the present argument does not appeal to a first instant of change, changed part or first change, and Aristotle’s repeated statements (262a31–b1; b19–20, cf. b22–23; b26–27; b30; cf. also 262a28–29, b15–16) only imply that the time at which a body has arrived at an actual point must differ from *any* time at which it has

departed; thus it follows that it can only have departed after it has arrived, and thus there must be some interval before any time at which it has departed.

Nevertheless, as Sorabji sees, Aristotle faces an objection that throughout this interval it might have already departed. In answer, the argument fundamentally relies on the grounds for, and implications of, the body's having to be actually at the endpoint, as discussed above. Here, not making the alternative assumptions of modern physics and calculus, Aristotle gives teleologically informed ontological grounds for thinking, given that any time at which the body has already departed is later than when it has first arrived, that there must be, in between, some essentially determinate (cf. *Ph.* 6.5, 236a17–27), although possibly circumstantially indeterminable, interval of its presence at the end, and so of rest (cf. White, pp. 114–115). He would deny, on ontological grounds, that this could be an infinitesimal, yet could consistently hold in any particular case that such an interval must be too short to be detected empirically (although note 262a18). Waterlow (1983, p. 143) shows why, following from Aristotle's teleological explanation of movement in *Ph.* 3.1, with regard to the body the first instant of its arrival must differ ontologically from any instant during a movement. Nevertheless she does not discuss the implication that, in order for this to be so, there must be some period circumscribing the body's resultant distinctive state of which this first instant is merely one limit. In particular the instant of arrival could not just be the limit of the reverse movement, because given Aristotle's teleological definition of movement it is an instant of a different kind of state, but a state can no more be instantaneous than a process, since an instant is merely a cutting or limit of one of these, and thus there must follow a further final limit of that state before reversal.

Charlton's analysis (p. 139) of 262b23–28 derives 262b27–28, here *b.i.i.*, as his (iii), that if a body does not rest before reversing, it both is and is not at the terminus at the same time, from the premisses (i), that if the body does not rest, its having finished movement to the terminus is simultaneous with its having started movement from it, and (ii) that at the moment it has finished movement to it, it is there, and at the moment it has started movement from it, it is not there. He then argues that Aristotle should have replaced (i) with (i)' that if the body does not rest, its *finishing* movement to the terminus is simultaneous with its *starting* movement away, and by implication (ii) with (ii)' that at the moment it *finishes* movement to it, it is there, while at the moment it *starts* movement away it *is* there. But then, Charlton observes, Aristotle could not conclude a rest was necessary. But the use of the expression "at the moment" in (ii) and (ii)' implies that the body is at the terminus only for what Aristotle calls a 'cutting' of time. Charlton ignores Aristotle's immediately following argument (262b28–32, here *b.ii.i* and support), that this is not possible because the body

must actually be at the terminus, discussed above, presupposing a teleological conception of movement inconsistent with the conception of instantaneous events implied by Charlton's replacement of Aristotle's perfect with present tenses.

Drozdek (pp. 61–63), from the viewpoint of modern science, argues against Aristotle in two ways. Criticising his reasoning as a “merely verbal solution to a physical problem” (which underestimates Aristotle's methodology), he first describes an alternative account, that a body is arriving, and so in motion, up to and including the instant at which it reaches the end of a path, and then is in motion leaving the end, such that movement is continuous; Drozdek argues that Aristotle himself allows for this, by his treatment of a hypothetical midpoint at 262a28–31, and similarly a point on a circle at 264b10–11, because any point picked out in this way is hypothetically actual, and yet Aristotle allows that the moving body is only there instantaneously, so the same should apply to the endpoint. But, to reverse the argument, it would be absurd to reason, given that a body pauses at an endpoint because it is actual, that equally it must pause at any hypothetical midpoint because that is hypothetically actual; accordingly Aristotle could reject Drozdek's view on the grounds that what is hypothetical cannot be assimilated to the case of what is actual with respect to actual movement and rest (262a21–22).

Secondly Drozdek argues against Aristotle on physical grounds, noting initially the possibility of a sinusoidal oscillation, with zero velocity only instantaneously at its limits, and then redescribing Aristotle's case as a body with velocity alternating solely between v and $-v$, each beginning at the start of a passage; from the formula for integrating the velocity with respect to time he deduces that motion is continuous and uniform even at the limit points. But this is a matter of definition, assuming instantaneous velocity and motion at the starting points. In any case Aristotle could argue that the stipulation that velocity occurs at the start (but not the endpoints) is arbitrary, and otherwise the contradictory outcome of both v and $-v$ at the endpoints means there is no velocity there. Drozdek argues Aristotle allows his stipulation, appealing to 263b12–15, where the final point of a change is allotted to the subsequent condition with respect to what changes, but that is incorrect, since the question here is not about an attribute of the body (like position), but the movement itself.

Copernicus (*Commentariolus*, *De revolutionibus* 3.4), cited by Drozdek (pp. 64–65) seems closer to showing that Aristotle is wrong in his own terms: to simplify Copernicus' example, one sphere carrying another with its poles at an angle to the first's, and with equal but opposed angular velocity will produce at any given point on the surface of the carried sphere (except its poles) a

reversing movement back and forth across the equator of the carrying sphere (latitudinal libration), which must be continuous, or else the spheres would have to stop revolving. Yet Aristotle could still argue that his claim only applies to component movements (cf. above 261b28–31), which are here circular and so don't contradict it.

Note on Ch. 8, 263a4–264a6: (A.2.2) Corollaries concerning Points

This section contains two subdivisions, (A.2.2.1) a corollary to solve Zeno's 'dichotomy' paradox (263a4–b9), and (A.2.2.2) another concerning the status of the instant of completion of a movement (263b9–264a6). Thereafter (A.2.3), Aristotle returns to the topic of Section A.2 of the chapter, with four more arguments (III–IV) against the possibility of continuous reversing locomotion in a straight line.

Ross (p. 715) says all of 263a4–264a6 is a digression answering Zeno, although in fact 263b9–264a6 treats another problem that arises for Aristotle's own doctrine. Zekl (p. 291 n. 145), agreeing with Ross, calls 263a4–264b9 an insertion, since 264b9 (on continuity of circular locomotion) follows naturally after 263a2–3 (on the discontinuity of motion in a straight line); see below on his view of 264a7–b9 (p. 264). For Aquinas' view see the *Commentary* on 262b8–22 above (pp. 242–243).

Ch. 8, 263a4–11: (A.2.2.1.1) Statement of Zeno's Paradox, 'the dichotomy'

263a5

We must answer in the same way those who raise the question of Zeno's argument, whether it is necessary always to traverse the half, and these are infinite, while it is impossible to completely traverse the infinite; or as some people raise the question of this same argument in a different way, thinking it right jointly with being moved halfway first to count separately each half that comes about, so that when one has traversed the whole path it turns out that an infinite number has been counted, which is by common agreement impossible.

a10

Analysis

Aristotle here recognises a general objection to his natural philosophy overall, that any movement is impossible (supplied), supported by two distinct arguments (I and II), by Argument I because, (I.a) any movement involves travers-

ing the infinite (supplied), since (*I.a.i*) in order to traverse any distance, it is necessary first to traverse half of it (263a5–6); but (*I.a.ii*) each half is infinitely divisible into halves (263a6) – while (*I.b*) it is impossible to traverse the infinite completely (263a6) – by Argument *II* because (*II.a*) in order to traverse a path completely one must be able to have counted an infinite number (263a9–10), since (*II.a.i*) in order to traverse half any distance one must at the same time be able to count off that half as it comes about (263a7–9); but (*II.a.ii*) each half is infinitely divisible into halves (supplied: cf. 263a6) – yet (*II.b*) it is universally agreed that it is impossible to have counted an infinite number (263a10–11).

Commentary

For the ‘dichotomy’ paradox⁸ see *Ph.* 6.2, 233a21–31 and cf. 6.9, 239b11–13, with Ross (pp. 658–659) on whether it took the form of positing the impossibility of traversing the infinitely subdivided first half of any distance, or the second half; the *Analysis* above assumes in both arguments that Aristotle has in mind the first half. Generally on Zeno’s paradoxes see, e.g., Sorabji (1983, pp. 321–335).

Note

Sorabji (1983, pp. 324, 345, 362) identifies the second formulation of the problem (263a7–11), here Argument *II*, as from the Academy, possibly by Xenocrates, noting it is more easily disposed of, since the impossibility of counting an infinity involves the impossibility of traversing the sum of the times taken to count each number in turn, but these times bear no quantitative relationship individually or in sum to the reducing divisions of the distance.

Ch. 8, 263a11–23: (A.2.2.1.2) Re-evaluation of Previous Solution to Zeno’s Paradox

*Now in our first discussion of movement we solved this problem through 263a11
the fact that the time involved contains an infinity within itself. For there
is nothing strange if someone traverses an infinity in an infinite time.
The infinite occurs similarly in the length and in the time. But while this a15
solution is adequate in relation to the questioner (since the question was*

8 Graham (1999, p. 143) accidentally misnames this the stadium argument (= *Ph.* 6.9, 239b33–240a18).

a20

whether in a finite time it is possible to completely traverse or count an infinity), in relation to the subject and the truth it is not adequate. For if someone leaves aside the length and the question whether in a finite time it is possible to completely traverse an infinity, and makes this inquiry in the case of the time itself (for the time contains infinite divisions), this solution is no longer adequate, but we need to state the truth, exactly as we did in the immediately preceding discussion.

Analysis

Aristotle's justification for revising his previous solution to the 'dichotomy' paradox is that while (a) his previous solution is dialectically adequate (263a15–16; see *Ph.* 6.2, 233a21–31; cf. 6.9, 239b11–13), because (a.i) it answers the question whether it is possible to completely traverse or count an infinity in a finite time (263a16–17); and (a.ii) the answer is that it is possible because the time also contains an infinity by division (263a12), since (a.ii.i) there is nothing strange if someone traverses an infinity in an infinite time (263a13–14); and (a.ii.ii) the time of the movement is infinitely divisible in the same way as the length of the path is (263a14–15) – nevertheless (b) that solution is inadequate in relation to the subject matter and the truth (263a17–18, a21–22), since (b.i) excluding the infinity of the length from consideration, we still need to answer the question how the time itself can contain an infinity by division (263a18–21); and (b.ii) the truth involves the preceding distinction between actual and potential points (263a22–23).

Commentary

As Graham (1999, p. 143) observes, the problem's earlier solution from Bk 6 summarised here shows that the arrow travelling to the target never runs out of time for its remaining movement (see 263a14–15, here a.ii.ii). Apostle (p. 332 n. 32) explains Aristotle's characterisation of his earlier solution as dialectical as conceding that the path traversed contains an actual infinity by division (263a13–14, here a.ii.i), but countering by showing that in that case so does the time taken, despite its also being finite overall; but now Aristotle defends his own theory that there is no actual infinite.

Simplicius (1289.39–1240.4) presents the revised problem as that of how the moving body reaches the end of the infinitely divisible time period. Graham (1999, pp. 143–144, and cf. Bolotin, pp. 336–338), adds that if time and space were actually infinitely divided, Aristotle thinks they could not be continuous, nor could movement, since each division point would function as two separate points, end and beginning of separate segments. Similarly Themistius (229.27–30) observes that this contradicts the problem's assumption, that movement,

distance and time, are all continuous. The *Analysis* here and following is essentially consistent with the brief discursive account of the revised form of the problem Aristotle here faces, along with his solution, given by Ross (p. 714); see similarly Cornford (1934, p. 380 n. a).

Note

Bowin (p. 321, and cf. similarly Wagner, p. 693), asserts incorrectly that the reference at 263a22–23, here *b.ii*, to “the immediately preceding discussion” (ἐν τοῖς ἄρτι λόγοις) is to 262a26–b8, here Argument *II.1.I* above, the first proof that a moving body does not come to be at any midpoint, which the new solution to Zeno’s paradox will also establish. But the basis of the new solution is the distinction between potential and actual points on the line, which occurs not in Argument *II.1.I*, but is fundamental to Argument *II.2* at 262b30–32, immediately preceding the corollaries here, although first introduced as one of two basic principles at 262a21–25, introducing Argument *II.1*.

Ch. 8, 263a23–b9: (A.2.2.1.3) New Solution to Zeno’s Paradox

For if someone divides the continuous ⟨line⟩ into two halves, he uses the one point as two, since he makes it a beginning and an end. Both someone counting and someone dividing it in half does so. In the case of such a division neither the line nor the movement will be continuous, since a continuous movement is along a continuous path, while in what is continuous there are an infinite number of halves, although not actually, but potentially. But if he does this actually, he will not make it continuous, but will stop ⟨the movement⟩, which it is clear is precisely what happens in the case of the man counting the halves, since he has to count the one point as two. For it will be the end of one half and the beginning of the other, if he does not count the continuous ⟨movement⟩ as one, but as two halves. As a result, we must say to someone asking the question whether it is possible to completely traverse an infinity, either in a length or a time, that it is possible in a way, and in a way it is not. For it is not possible to traverse an actual infinity, but it is possible to traverse a potential infinity. For someone being moved continuously has traversed an infinity incidentally, but not simply, since the line incidentally contains an infinity of halves, but its substance and being is different.

263a23
a25

a30
263b1

b5

Analysis

Aristotle's solution states it is possible in one way to traverse the infinite completely, either in a length or a time, although in another way not (263b3–5), since (*a*) it is not possible to traverse an actual infinity, but it is possible to traverse a potential infinity (263b5–6), because (*a.i*) someone moved continuously has traversed an infinity incidentally, but not simply (263b6–7), since (*a.i.i*) the line along which he is moved continuously contains incidentally an infinity of halves, but its essence is different (263b7–9), because (*a.i.i.i*) in what is continuous there are infinite halves not actually, but potentially (263a28–29); and (*a.i.i.ii*) someone counting the halves of a continuum as distinct is actually dividing it in two (263a25–26, a30–31; cf. b2–3); while (*a.i.i.iii*) if someone divides a continuous line or movement (or time) into two halves, he treats it as no longer continuous, and the movement will terminate (at the division point) (263a26–27, a29–30), since (*a.i.i.iii.i*) the one point functions as two distinct points (263a23–24, a31–b1), because (*a.i.i.iii.i.i*) this point is treated as the end of one half, and the beginning of the other half (263a24–25, b1–2) – while (*a.i.i.iii.ii*) continuous movement is along a continuous path (in a continuous time) (263a27–28).

Commentary

This *Analysis* accords with Wicksteed (p. 382 n. *a*): the line's essence involves its continuity and unity between endpoints; its potential for points of division perhaps belongs to its intellectual matter, as analogously the potential for reversion to the substance of the elements belongs materially, and so incidentally, to an organic body, but the actual plurality of those elemental masses does not belong at all to the essence of the body *qua* living being; cf. similarly Waterlow (1982, pp. 153–154), effectively distinguishing between the implications of a mathematical and metaphysical analysis. As Wicksteed, referring to *Cael.* 1.12, 281b15–18, says, unity and multiplicity are alternative transformative potentialities of the subject *qua* matter, not those functional potentials of a persisting subject *qua* form that Aristotle calls second potentials (citing *Ph.* 8.4, 255a30–b5).

Notes

Apostle (p. 322 n. 34) thinks 263a25–26 (cf. a30–31, b2–3), here *a.i.i.ii*, claiming that someone counting the halves of a continuum as distinct is actually dividing it in two, means a pause must follow each half counted. The idea is rather that counting treats each half counted as separate, and so the whole line as not one. As he notes (p. 322 n. 35), according to *Ph.* 4.13, 222a14, 'real' time is not actually divided at any 'now', which only divides potentially, in fact uniting

past and future; rather the periods we think of in counting two halves divided at a 'now' are *ipso facto* two.

Wieland (p. 302) interprets 263a26–27, here *a.i.i.iii*, asserting that to treat a line as divided is to treat movement along it as not continuous, as implying that continuity itself is only conceivable in terms of its potential divisibility.

Simplicius (1291.35–1294.2) disputes Alexander's interpretation of 263b7–9, here *a.i.i*, the claim that the line only incidentally contains an infinity of halves. Alexander (ap. Simplicius) had 'potential(ly)' (δυνάμει) in his text at 263b7–8 which he explained ambiguously as meaning that the line incidentally contains an infinite number of halves potentially (or: of potential halves), but Simplicius, with our text, denies that could be right because a line cannot actually be divided into an infinity of halves, but only divided infinitely (i.e., without limit), and therefore the addition of 'potential(ly)' is superfluous, presumably since this is already an incidental potential of anything continuous. Sorabji (1983, p. 213, cf. p. 339), citing 263b3–6 (see esp. b5–6), thinks Aristotle here means there is an infinity of potential divisions in the line (apparently Alexander's view, ap. Simplicius), not that the line is infinitely potentially divisible (so Simplicius: and cf. Alexander fr. 748.2–3 Rashed, with Simplicius 1291.10–11). Notwithstanding Aristotle's language, it seems to me a mistake in modal logic to infer, from the claims it is possible to traverse a potentially infinite number of halves (b5–6, here *a*), or that the latter belong incidentally to the line (b7–8, here *a.i*), or that they are in the line potentially (a28–29, here *a.i.i.i*), to the claim that such an infinity exists: for Aristotle, each such potential half only exists *qua* potential in such a way as to exclude the concurrent existence of the combined potentialities of all others together; Sorabji effectively commits a fallacy of composition. See rather Coope (p. 10 with n. 22), and White (p. 111 with n. 54), although White, and cf. Zekl (p. 291 n. 143), is unduly worried that infinite time for Aristotle counts as an actual infinity: rather, the divisions marking time in past and future (as such) are merely potential except as made in counting, since otherwise only the 'now' divides time actually (and cf. *Ph.* 4.14, 223a21–29). Aquinas (8.1118) seems unaware of the problem, asserting both that an actual infinity cannot be traversed, only a potential one, and that a finite line contains an infinity of points in potential. See also Bolotin (p. 338), who having surveyed Aristotle's treatment of the infinite in *Ph.* 3 and 6, concludes that here potential infinite divisibility is identified with the indefiniteness of the points of potential division. Philoponus (844.28–845.15) mistakenly thinks Aristotle means the line is only incidentally continuous (presumably misconstruing κατὰ συμβεβηχός, 263b6–7 with what precedes).

Note on Ch. 8, 263b9–26: (A.2.2.2) Status of a Point of Completion

The purpose of Corollary 2 here is to avoid contradictions arising from the application to time of the principle that a midpoint functions as both the end of a first part and beginning of a second part of a continuum, when these are distinguished by the state of a subject. This produces the puzzle that at the instant completing a change (*qua* part of the first time period) the subject is in the former condition, but at the same point in time (*qua* part of the latter period) the subject is in the latter, changed, condition; cf. Philoponus (845.16–27). Aristotle's response stipulates that this instant in this respect belongs only to the latter period; thus Ross (p. 714) considers it just as difficult to accept as the rejected alternative, but the stipulation is not arbitrary: see Sorabji (1983, pp. 413–414).

Aristotle here rejects the view of changing phenomena subject to contradictory predicates that supports the Platonist distinction between becoming and being, replacing it with his teleological doctrine that for changing phenomena to be is to *have* become, thus to be actual, in the terminus of a process; cf. Waterlow (1982, p. 156). So there is a point in time at which a complete actuality begins to be the case, before which, during the preceding process of becoming, it has not yet become (complete). At *Ph.* 6.5, 235b32–236a27, Aristotle argues that “that in which something first has (completely) changed” must have a unique reference, the terminus, whereas “that in which something first begins to change” has no reference; *pari passu* the same will go for the last moment of rest (definite) and the last moment of change (indefinable).

Again, while Ross's note (pp. 649–650) suggests Aristotle's underlying thought is that the beginning and end of a process are limits, and so not parts of it, Aristotle treats the end, the beginning of the subsequent state, as part of the latter. Thus the discrepancy in treatment has also a deeper cause: ultimately, presumably, the assumption that change, although teleologically directed, is internally (at least) ontologically incomplete, partially indeterminate and so unstable, whereas the complete actuality of either a preceding or resultant condition is ontologically stable, so that the temporal, like the qualitative, limit of each in a subject belongs to these, and not the preceding or following process of becoming, since a limit defines a form of being, and so belongs to that.

On Wicksteed's interpretation of this section as a defense of the simultaneity of arrival and departure from an endpoint when a body reverses direction, see the *Commentary on Ch. 8, 262b22–263a3: (II.2) on the requirement to stop at an endpoint*, above (p. 247).

Aristotle first (A.2.2.2.1) presents his doctrine (262b9–26), then gives two arguments (A.2.2.2.2.I–II) against an alternative possible solution, that time is

composed of a series of indivisible units, whereby the last part of a change occurs in one, and the resultant condition begins in the next (263b26–264a6).

Ch. 8, 263b9–26: (A.2.2.2.1) Status of a Point of Completion, Aristotle's Solution

It is also clear that unless one makes the point in time that divides earlier and later always to belong to the later ⟨time⟩ regarding the subject, the same thing will be jointly something that is and is not, and, when it has become, something that is not.⁹ So while the point is common to both, belonging both to earlier and later, and one and the same thing in number, in account it is not the same (since of one it is the end, and of the other the beginning); but regarding the subject it always belongs to its later condition (παῖος). The time is that to which ACB applies, the subject that to which D applies. This is white in time A, but in B not white. Thus in C it is white and not white. For in any part at all of A it is true to call it white, if throughout this time it was white, and in B not white. But C is in both. Thus it should not be granted (that it is white) in every ⟨part of A absolutely⟩, but ⟨in every part⟩ except the last to which C applies. And this now belongs to what is later. And if it were becoming not white and the white was perishing in the whole of A, it has become ⟨not white⟩ or ⟨the white⟩ has perished in C. As a result, it is first true to call something white or not white in that time,¹⁰ or else when it has become so it will not be so, and when ⟨the white⟩ has perished it will be so, or it must be white and not white jointly, and in general terms something that is and is not.

Analysis

Aristotle argues for two main claims here (the second stating the result), (1) that an instant is common to both earlier and later periods, one and the same in number while (two and) different in account (263b12–14), since (1.a) it is the end of one period and the beginning of another (263b14) – nevertheless (2) regarding the subject, the instant that divides earlier from later always belongs to the later period (263b14–15; cf. b9–10, b20–21, b23–24), since (2.a) let

9 What would both be and not be is the subsequent condition (παῖος, b15) that the subject has begun to be at the point in time divided from what preceded.

10 See the *Note* below on 263b23 (pp. 258–259).

us assume the subject D is white during time period A but not white during B (263b15–17); in which case (2.b) if during the whole of A, D is becoming non-white, and the white is perishing, then at the end of A, instant C, it has become non-white and the white has perished (263b21–23), because (2.b.i) if instant C belonged to both periods A and B, the same subject D at that point would be both something that is what it has become at that point, (e.g., non-white) and still not yet that, and when what it previous was (e.g. white) has ceased to be, it is still that (263b9–12, b17, b23–26), given (2.b.i.i) that if throughout A, D is white, at any instant in A, D is white, and similarly at any instant in B, D is not white (263b17–19).

Commentary

Notwithstanding Aristotle's counter-intuitive example (becoming non-white), the later period, as the goal of change under his teleological conception of movement, is a stable self-identical condition, and so the limit instant belongs to the latter state of the subject. Aristotle slightly overstates his conclusion claiming the limit always belongs to the latter state (references for 2 above), since, on the contrary, there is no first moment of change (*Ph.* 6.5, 236a26–27), and the limit of a period of rest before change must belong to the former period with regard to the subject. For general discussion of the problem and Aristotle's solution see the *Note on Ch. 8, 263b9–26: (A.2.2.2) status of a point of completion*, immediately above (pp. 256–257). The *Analysis* is non-controversial.

Notes

The expression “regarding the subject” (τῷ πράγματι, 263b10–11, b14–15, here in 2), means “when we consider what is true of the subject at what time”; cf. Alexander (fr. 751 Rashed). Apostle (p. 333 n. 40) explains: “In other words, if a thing changes from white to black at moment *t*, then the thing is black at *t* but not white.” Cf. Graham (1999, pp. 144–145). Simplicius (1294.33–1295.2) before offering this interpretation, suggests, alternatively, that τῷ πράγματι means “regarding the condition (sc. of the subject), at a given time”. Waterlow (1982, p. 155), translating “as far as the fact is concerned” seems to overlook the qualification in viewpoint, asserting Aristotle here changes his doctrine, citing *Ph.* 6.3, 234a33–b5, where a transition point is treated as belonging to neither movement nor rest.

Ross (p. 715) explains “white or not white” (λευκὸν ἢ μὴ λευκόν, 263b23, here in 2.b.i), as that Aristotle now considers both opposite changes together. Cornford (1934, pp. 384–385 n. b) takes λευκόν as logical subject of three following alternatives at 263b23–26, and ἢ (b23) as introducing the first (‘either ...’), but this

would imply in the first case that the body was still white when it could first be called non-white, the opposite of what is needed here (and cf. his third alternative, really just a restatement of the illogicality implied in the second). Graham (1999, p. 145) gives further reasons for rejecting Cornford's treatment.

Ch. 8, 263b26–264a1: Rejection of Atomic Time Units, (A.2.2.2.2.I) from Time Between

Introductory Note

Here and in 264a1–6 (following) Aristotle responds to an objection claiming a better solution to the problem of a completion point is that, in a last indivisible unit of time A, D is not yet white, and, in a next indivisible unit of time B, it is white (263b27–30). Aristotle replies (A.2.2.2.2) that time cannot be divided into indivisible units (263b27–28), supported by two independent arguments, (I) from the time between putative indivisible units (263b26–264a1), and (II) from the total time involved in a change (264a1–6: see following, pp. 261–263).

But if whatever was previously not something that is must become something that is, and when it is becoming it is not, time cannot be divided into indivisible temporal units. For if, in A, D were becoming white, and has become and jointly is so in another adjacent indivisible time, B—if in A it were becoming, it was not, but in B it is—, there must be some becoming in between, so that there must also be a time in which it is becoming.

263b26
b30
264a1

Analysis

Argument I concludes by *reductio ad absurdum* that time cannot be composed of indivisible units, because (I.a) if it were composed of indivisible units, in indivisible time A, D would be becoming white, and in adjacent indivisible time B it would have become and now be white (263b28–30); yet (I.b) in that case there would have to be time between A and B (263b31–264a1), because (I.b.i) there must be some becoming between A and B (263b31), since (I.b.i.i) in A, D is not yet white, but in B it is white (263b30–31), because (I.b.i.i.i) in D, A is becoming white and in B it is white (263b28–30 = I.a above); and (I.b.i.i.ii) when something is becoming, it is not yet what it will have become once finished becoming (263b27) – while (I.b.i.ii) something that is, having not previously been so, has had meanwhile to become something that is (263b26) – yet (I.b.ii) any becoming requires time (supplied) – but (I.c) there is nothing of the same kind between adjacent units (supplied: see *Ph.* 5.3, 226b34–227a6).

Commentary

With this *Analysis* cf. similarly Apostle (p. 333 n. 45). The analysis by Graham (1999, pp. 145–146) corresponds partly, although he does not relate his steps to the text. Consequently, apparently, he wrongly assumes that the claim that some becoming must occur between two adjacent indivisible temporal units (263b31, here *I.b.i*), requires as support the claim that what becomes (here, white), must in the former time be absolutely not (white), that is, not yet becoming (white); but see rather *I.b.i.i.i* here (appealing back to *I.a*, 263b28–29). Graham's supporting claim, he notes, would contradict Aristotle's explicit assumption that in the former time the body is becoming white (whereas as given here, the latter is the support). For more general comment on Graham's misconception (pp. 146–147) of the argument's target see further below on this passage.

Bowin (pp. 331–332) misunderstands the argument as concerning a division of time into a series of 'nows', to which there is no reference in the text (cf. rather Wagner, p. 694), and Bowin's principle of division, isomorphic with his hypothesis of dividing a line at every point, would not produce a unique series of contiguous time units, which is what the argument requires, let alone of 'nows' (*Ph.* 6.1, 231b6–8).

Aquinas (8.1122), cf. Philoponus (846.19) and similarly Simplicius (1297.35–39 and 1298.22–24), adds an infinite regress, that, since between putatively adjacent temporal units there would have to be another when the becoming between them takes place, there would equally be a further unit between the additional unit and the final one during which the change from becoming to having become occurs, and another between that and the final one, *ad infinitum*; but this is not indicated in Aristotle's text. Simplicius (1297.39–1298.3) seems mistaken to assert that Aristotle investigates when D has first become white; the argument assumes that this is the case at B (263b29–30, here *I.a*). Simplicius (1298.15–33) treats the limit of A, as opposed to the time interval B, as when D has first become white, while (apparently by contrast) B as when it already *is* white, contrary to Aristotle's treatment, which systematically identifies having become with being (e.g., γέγονε δ' ἄμα καὶ ἔστιν, 263b29).

Aquinas (8.1122) first describes this argument as a corollary, then as, in effect, a defence of a presupposition of the previous argument. Themistius (230.5–12), as Todd (trans. of Themistius, p. 90 and p. 150 n. 796) shows, treats the argument overall of 263b9–264a6 (Corollary 2, status of a point of completion) as a dilemma: unless, regarding the subject, the point of temporal division belongs to the later period, either (i) the subject has contradictory predicates, or (ii) absurdities arise from assuming time consists of successive units. Simplicius

(1296.38–1297.9) more specifically claims Aristotle presupposes that there cannot be adjacent indivisible units of time when arguing that there must be a rest between an object's arrival at the end of a rectilinear path and its return (262a31–b8, here Argument *II.1.I*, by exclusion of rest in continuous movement; cf. 262b23–27, here in *Ch. 8*, 262b22–263a3: (*II.2*) *on the requirement to stop at an endpoint*); yet there is no reference back to that context now.

Graham (1999, p. 145) apparently thinks the present argument is incidental to Aristotle's purpose; but in fact to say time consists of indivisible units might have seemed a better solution to the question when something has changed (ignoring *Ph.* 6.1–5, esp. 6.2, 233b15–32) since we could say during a series of units the thing was changing, but these were followed by a first unit when it had finished changing; then it would have been unnecessary to assert that at an instant it first had changed, and that this instant only belonged to the subsequent period. But, as Aristotle will now show again, this would mean there must be a change between the last of the former series of units, and the first of the subsequent series, and so time between the putatively adjacent units when that change occurred. Graham (1999, pp. 146–147) wrongly assumes the theory Aristotle opposes “must compress all changes into a single moment”; rather, the ‘theory’ is compatible with the change of becoming white occurring either within atomic moments or only between adjacent ones, and Aristotle's refutation does not depend on all change occurring either within one such moment or between two such: it only requires that there is a change in the final two adjacent moments between becoming and being white, and that becoming implies not being (completely) white, whence it follows that change occurs between the last moment of becoming white and the first of being white, and so time between putatively adjacent units. Graham (1999, pp. 147–148) reviews scholarly speculation as to who might have held the refuted view, concluding, following Bostock (p. 183) and Ross, that perhaps Zeno's paradoxes suggested it to Aristotle and he himself first deduced the implications of any continuum being either infinitely divisible or not.

Ch. 8, 264a1–6: Rejection of Atomic Time Units, (*A.2.2.2.2.II*) from Total Time

For the account will not be the same also for those who say there are no 264a1
indivisible units, but during the time itself in which there was becoming, in
the final point it has become and is, after which there is nothing adjacent
or next in series. But indivisible times are in series. But it is clear that if it a5

was becoming in the whole time A, there is no greater time in which it has become and was becoming than all of that in which it was only becoming.

Analysis

Argument *II*, from the total time involved in a change, continuing the same model of body changed (D) and times (A when D still changes and B when it has finished), also concludes that time cannot be divided into indivisible units, because (*II.a*) it is clear that if D is becoming during the whole of time A, there is no greater time in which it is becoming and also has first become, than that in which it is only becoming (264a4–6); and (*II.b*) only those who deny there are indivisible units of time can account for this (supplied: cf. 264a1–2), since (*II.b.i*) if there are no indivisible units of time, at the final instant in which there was becoming, something has become and is, after which there is nothing adjacent or next in series (264a1–4); but (*II.b.ii*) if there were indivisible units of time, something would only have become and be in the next unit after the last when it was becoming (supplied), because (*II.b.ii.i*) indivisible units would be in series (264a4).

Commentary

In summary, since the time inclusive of when something first has become is no greater than the time the becoming took, that in which it has first become must be an instant, rather than a separate unit, or more generally, any additional period of time; thus briefly Ross (p. 715), Cornford (1934, p. 386 n. *b*), referring to *Ph.* 6.5, 235b19–236a7, which argues independently for the latter point, and Philoponus (846.1–7). Graham (1999, pp. 148–149) complains that this contradicts the stricture that the point of first having become belongs not to the time period of becoming but to the subsequent time (263b9–26), overlooking the qualification there, “regarding the subject”, since the present question is not when the subject is in the end-state, but when the process of becoming is first complete.

Notes

Simplicius (1298.4–12), followed by Ross (p. 449), understands 264a1–2, here in *II.b* and support, “For the account will not be the same also for those who say there are no indivisible units”, as referring to the immediately previous inference to time between putatively adjacent units (263b31–264a1), describing a1–4 as rejecting an objection that the previous difficulty also arises for those claiming time is continuous. This is plausible, but “the same account” more probably means the assumption that further time is required subsequent to becoming for the state of having become; thus see here *II.b.ii*, supplied, with

that implication. Apostle (trans., p. 175) treats all of 264a1–6 as part of Argument I, translating δέ (264a4) ‘so’, which is unlikely.

Given the above, Simplicius (1299.20–35) is wrong to treat 264a4–6, here *II.a*, as a separate argument; rather it states that what is said (at 264a1–4, here *II.b* and support) to follow only from the assumption of the continuity of time, is in fact perceptibly true and so confirms that assumption.

Ch. 8, 264a7–9: (A.2.3) Introduction to the Dialectical Arguments

These, then, and others like them, are the arguments specific to the subject by which one might be convinced; but to those investigating by general reasoning the case would seem to someone to turn out the same also on the following grounds. 264a7

Commentary

Ross (p. 715) notes “the arguments specific to the subject” (264a7–8), are those from 261b27–263a3, here *A.2.1.I–II*, that reversing locomotion cannot be continuous, prior to the digression; the distinction between these and the following is between reasoning from nature (φυσικῶς, *phusikōs*) and from what is intrinsically intelligible (λογικῶς, *logikōs*),¹¹ the latter as Graham (1999, p. 149) remarks, usually being either dialectical assumptions or general principles. The four general Arguments *III–VI* following (264a9–b9) apply to all types of movement; cf. also Apostle (p. 334 n. 48). Wicksteed (p. 386 n. c) explains the dialectical arguments as aiming to show for interest’s sake alone that all non-locomotive movements must cease, like rectilinear locomotion; yet that has already been established in the previous chapter. Rather, these arguments aim to reinforce the result for rectilinear locomotion by showing it shares relevant features with the other movements, which exclude endless continuity. Owen (p. 250 n. 34) denies the distinction here is between arguments involving physical theorems and arguments of greater generality, but those Aristotle calls “specific to the subject” do involve premisses specific to locomotion, whereas the second group either explicitly generalise from locomotion to other changes (cf. 264a14), state that they are generic to movement (264a22–24), or involve induction from

11 For the terms in Ar., *GC* 1.2, 316a11, but for the sense, e.g. Simplicius *in de An.* 15.19–21 (εἴωθε γάρ τῳ φυσικῶς ἀντιδιαστέλλειν τὸ λογικῶς τὸ κατὰ τὸ φαινόμενον καὶ ἔνδοξον, ἀλλ’ οὐ κατὰ τὴν φύσιν καὶ τὸ εἶναι τῶν πραγμάτων εἰλημμένον).

alteration (264b1–6, b6–9). Zekl (p. 291 n. 145) seems to misrepresent this section as merely a “side-version” of 262b22–263a3, here Argument *II.2*, ignoring the differences indicated.

Ch. 8, 264a9–21: (*A.2.3.III*) Second Argument from Contrary Movements

See 261b33–262a12 above for *A.2.1.I*, the first argument from contrary movements (pp. 230–233).

264a10 *For everything continuously being moved, unless it is knocked aside by something, was also earlier being transported to that to which it came by transportation, such that if it came to B, it was also being transported to B, and not when it was nearby, but immediately when it began to be moved; for why <does it have that goal> now more than earlier? And similarly also in the other cases.¹² Now <let us assume> when something*
a15 *transported from A comes to C, it will again have arrived at A by being continuously moved. Thus when it is transported from A to C, then it is also being transported to A with a movement from C, so that it is transported jointly with contrary movements. For movements in a straight line are contraries. And it also jointly changes from that which it is not <yet> in.*
a20 *So if this is impossible, it must stop at C. Thus the movement is not one; for a movement separated by a stop is not one.*

Analysis

The end reveals the logical strategy, where Aristotle concludes movement from A to C and from C to A cannot be one movement (264a20), because (a) movement separated by a stop is not one movement (264a20–21); but (b) something moving from A to C must stop before moving from C to A (264a19–20), a claim two distinct although partly interwoven *reductio ad absurdum* sub-arguments support, (b.I) from co-incidence of contrary movements, and (b.II) from the impossibility of departure before arrival. (264a18–19, “And it also (καί) jointly changes from that which it is not <yet> in”, indicates *b.II* is a separate argument.)

¹² Ross (p. 715): i.e., in the other kinds of movement, increase/decrease and alteration; Wagner (p. 694) argues that this is irrelevant and Aristotle means other phases of the movement, but see the *Commentary*.

By Sub-argument *b.I*, the body moving from A to C then C to A must stop, because (*b.I.i*) otherwise when the body moves from A to C, it may then return to A with continuous movement (264a14–16); but (*b.I.ii*) in that case it is moved with contrary movements at the same time (264a17–18), because (*b.I.ii.i*) when it is moving from A to C, then it is also moving from C to A (264a16–17), since (*b.I.ii.i.i*) when it moves from A to C, it may then return to A with continuous movement (264a14–16, = assumption *b.I.i* above); but (*b.I.ii.ii*) anything changing naturally to a certain condition was also changing to that condition at any earlier point in a continuous change (supplied), because (*b.I.ii.ii.i*) everything continuously changing place, unless knocked aside by something, was previously already being moved toward the place it subsequently came to (264a9–13), since (*b.I.ii.ii.i.i*) there is no greater reason that it was being moved to that place later than earlier during the movement (264a13) – moreover (*b.I.ii.ii.ii*), this is similarly true for other changes besides locomotion (264a14) – yet (*b.I.ii.ii*) movements from A to C and C to A in a straight line are contrary (264a18) – while (*b.I.iii*) it is impossible to be moved with contrary movements at the same time (supplied: cf. 264a19).

By Sub-argument *b.II*, from the impossibility of departure before arrival, something moving from A to C must stop before returning from C to A (264a19–20), because (*b.II.i*) otherwise when a body moves from A to C, it may then return to A with continuous movement (264a14–16, = *b.I.i* above); but (*b.II.ii*) in that case, it jointly changes from where it is not yet (264a18–19), since (*b.II.ii.i*) in that case when moving from A to C, it is also moving from C to A (264a16–17, = *b.I.ii.i* above, with justification); but (*b.II.ii.ii*) if it moves from C to A, it moves from C (supplied); and (*b.II.ii.iii*) when it is moving from A to C, it is not yet in C (supplied) – yet (*b.II.iii*) it is impossible for something to change from where it is not yet (supplied: cf. 264a19).

Commentary

Wicksteed (p. 367, Introduction to Ch. 8) interprets this argument as hinging on the absurdity that if reversed movement were continuous, a body *after* reversing would *still* be moving towards what it now moves away from, whereas in fact the point of 264a9–18 is that *before* it reverses it is *already* moving towards what it currently moves away from, since the key premiss is that something is already moving toward its ultimate goal from the moment it first sets out (264a9–13, here *b.I.ii.i.ii.i*), a teleological premiss; thus Philoponus (846.21–25), the analysis in Graham (1999, p. 150), and perhaps Apostle (p. 334 n. 50). Simplicius (1302.13–21, cf. similarly Themistius 230.19, 21), interprets the absurdity in terms of the contrary impulses (ὁρμαί, *hormai*) the moved body would be contemporaneously subject to, yet explaining movement by impulses

is not Aristotelian (cf. *Note* on 255b27–29, p. 101), and not indicated in the text. Wagner's account (pp. 694–695) does not recognise the distinction between Sub-arguments *b.I* and *b.II*.

This argument applies primarily to locomotion (see esp. 264a10–11, κατὰ τὴν φοράν, ... ἐφέρετο) and is then generalised to other movements (a14, here *b.I.ii.i.ii.ii*). Although the dialectical arguments aim to demonstrate that rectilinear locomotion shares with the other movements features that exclude everlasting continuity (cf. *Commentary* on 264a7–9 above, p. 263), there is no circularity here: under ἐπαγωγή (*epagōgē*, eidetic generalisation; contrast the modern concept of induction) the specific case has the status of a paradigm where a general principle is directly recognisable, even when not explicitly articulated apart from the exemplification (cf. Simplicius 1302.9–13).

Drozdek (p. 63) argues (citing 264a18–19) that Aristotle equivocates on the expression 'at the same time' ('jointly': ἅμα, a17, 18), since during each cycle the body travels first in one direction, then in the other. This misses Aristotle's point, which presupposes a teleological individuation and identity of movement (cf. *Ph.* 1.7–9, 5.4): if there is no terminal rest before reversal, Aristotle argues, there can be no coherently individual movement to refer to, and so, he claims, no physical explanation. Yet we might deny that a body shortly to reverse direction without stopping is going *to* the endpoint where it will reverse (any more than *to* the other end) unless it stops there (see *Note* on 264a9–13 immediately following), and if so, there is no contradiction between legitimate descriptions of its movement. Aristotle could perhaps appeal to description of apparent direction as a common sense starting point for identifying a movement, which the hypothesis of instantaneous change of direction contradicts, on his argument.

Notes

Graham (1999, p. 150) notes the claim at 264a9–13, here *b.I.ii.i.ii.i*, that if something came to place B, it was being moved to B from the time it began to be moved, only applies regarding the ultimate end of a movement (the only point, strictly speaking, a movement ever 'comes to', for Aristotle); he cites *Ph.* 5.1, 224a34–b13, 224b35–225a20, specifying the goal as one of the necessary conditions of movement, and cf. the atypically expressed *Ph.* 1.9, 192a16–25.

264a13, here *b.I.ii.i.ii.i.i*, is an appeal to a principle of sufficient reason; Graham (1999, p. 150) compares Parmenides B8.9–10 and *Ph.* 8.1, 252a14–16.

On 264a17–18, here *b.I.ii*, the claim that the body changing direction without stopping would be moved with contrary movements at the same time, Gra-

ham (1999, pp. 150–151) suggests Aristotle could avoid this absurdity by distinguishing the movement from A to C as actual from contemporaneous potential movement from C to A; this is incorrect, since Aristotle's point is that if movement is continuous, both C and A equally describe its present goal; thus there is concurrent actual movement in each direction.

At 264a18 Cornford (1934, p. 388 n. 1) notes a possible textual supplement to explain another resultant absurdity Simplicius (1302.34–39, 1303.24–26) states, that the body would also be moving toward what it was already in, before mentioning that at 264a18–19, here *b.II.ii*; Simplicius then calls that in Sub-argument *II* the third. Yet he may have introduced his second himself, since he reports that Alexander added another argument (1303.27–33). Themistius (230.12–28) paraphrases only those we have at 264a9–21, but omits that following at 264a24–b1, here Argument *IV*.

Cornford (1934, pp. 388–389 n. a) also suggests two alternative interpretations of 264a18–19, here *b.II.ii*: if the movement is continuous, (i) what the body changes from is the same condition it is only approaching, or (ii) the change of movement at an extreme is from one it never was undergoing (since it was always approaching the other extreme); the former is more probably Aristotle's meaning, not requiring recognition of a change of movement. Zekl (p. 291 n. 146) too suggests the latter alternative. Apostle (p. 334 n. 51) also offers two interpretations, that a body ought not to have been where it started from, because that must be where it is travelling to, or that a body ought to have started from a different point from that it is going towards, but there is no such different point; the text's simple indicatives makes both unlikely.

At 264a18, here *b.I.ii.ii*, Sub-argument *b.I* states movements in contrary directions are contrary movements, just as the physical Argument *A.2.1.I* above, from the definition of a continuous unified movement, does (261b33–34, 262a6–7).

Ch. 8, 264a21–b1: (*A.2.3.IV*) Argument from the Opposition of Rest to Movement

Furthermore this is obvious from the following more general points about all movement. For if everything moved is moved with one of the stated movements, and rests with one of the opposed forms of rest (for there was shown to be no other besides these), and what is not always moved with this specific movement (I mean all those that differ in form, and not one

264a21
a25

a30 *that is a part of the whole movement) must previously rest in the opposed*
form of rest (for rest is a privation of movement)—then, if movements
in a straight line are contraries, and it is not possible to be moved with
264b1 *contrary movements jointly, what is transported from A to C could not be*
transported jointly also from C to A; and since it is not transported jointly,
but it will be moved with this movement, it must previously rest at C; for
this is the rest opposed to the movement from C. Therefore it is clear from
what has been said that the movement will not be continuous.

Analysis

Here Aristotle concludes what is transported from A to C and back to A must previously rest at C (264a32), because (a) what is not moved jointly with two different movements to which it is subject must undergo the opposed rest prior to each movement (supplied), because (a.i) everything moved is moved with one of the stated movements (locomotion, change of size, alteration), and rests (if it does) with one of the opposed forms of rest (264a22–24; see *Ph.* 5.1, 225b5–9, 5.2 and 5.6), since (a.ii) there are no others besides these (264a24) – and (a.ii) what is not always moved with a whole movement of a specific form must previously rest in the opposed rest (264a24–27), because (a.ii.i) rest is a privation of movement (264a27–28) – but (b) what is transported from A to C could not be transported jointly also from C to A (264a29–31), since (b.i) movement on a straight line from A to C is opposite to movement from C to A (264a28); and (b.ii) it is not possible to be moved with contrary movements jointly (264a28–29) – while (c) rest at C is the rest opposed to movement from C (264a32–33).

Commentary

This argument is essentially dialectical, since Premiss *a* and support (264a22–28) requires a potential opponent to assume generally that any finite movement, even as part of a series, is preceded by its privation, and in particular to agree this is the specifically corresponding form of rest; see 264a22–24, here *a.i* and a24–27, here *a.ii*. Then it is merely a matter of showing that this also applies to reversing locomotion.

The *Analysis* generally agrees with Simplicius (1304.10–32); nevertheless he does not state clearly the relationship and respective support of *a.i* and *a.ii* here (264a22–24 and a24–27), his version (1304.19–21) of *a* here (supplied) does not exactly fit the requirement and he merely paraphrases 264a28–32, here *b*, its support and the conclusion.

Philoponus (846.26–27) treats this argument as a corollary to the last, but clearly its basis is different. Zekl (p. 291 n. 148) notes it assumes the same

model of movement as the last, changing it by adopting a universal conceptual viewpoint, opposing movement to rest generally. Philoponus (846.31–847.2) and Wicksteed (pp. 367–368, Introduction to Ch. 8) construe the argument as defending the claim that when something reverses its direction of change it rests from the previous direction only, not from movement altogether, but 264a32 (the conclusion), clearly contradicts that, as Philoponus (847.3–9) effectively admits, although Wicksteed (p. 391) reads not ἡρεμῆσαι πρὸς τῷ Γ, with most manuscripts and Simplicius, but ἡρεμῆσαι τὴν πρὸς τῷ Γ (translating “motion toward [?] C must first have stopped at C”, which is semantically difficult). MS E gives τὴν πρὸς τὸ Γ, but see Ross (p. 115) for reasons why, when unsupported, E is generally not reliable; here τὴν probably arose by imitation of a33, τῇ ἀπὸ τοῦ Γ κινήσει.

Notes

The grammar and punctuation of 264a22–27 are debatable. Wicksteed (trans., p. 389) understands the protasis at a22–23 to end at κινήσεων, and καὶ ἡρεμεῖ ... ἡρεμιῶν (a23–24) to form the entire apodosis (thus Aristotle infers from the forms of movement to those of rest); thereafter τὸ δὲ ... ἡρεμίαν (a24–27) forms a separate sentence. This is stylistically plausible, but unfortunately implies all movements cease. Apostle (p. 334 n. 54) suggests omitting δέ (a24), leaving everything preceding it as a single protasis, and what follows as a single apodosis, and both he (p. 175) and Graham (1999, p. 29) translate as if this were the case (cf. Denniston s.v. δέ II.1.v, pp. 180–181). Ross (p. 450) and Zekl (trans., p. 221), by contrast, following Simplicius (1304.10–32, as above), treat a22–27 together as an accumulation of protases whose apodosis is assimilated to that following εἰ οὖν ... (a28), which on balance seems more probable.

On 264a32–33, here *c*, opposing rest to movement, Ross (p. 716) notes that *Ph.* 5.6, 229b28–230a7 and *passim* argues that a state of rest is contrary to both the opposed state of rest (health to disease), and also the movement towards the opposed state (i.e., away from itself). Cornford (1934, p. 390 n. *a*) refers to 261b15–22, 264a26–28, but these do not give the reason for the present claim.

Ch. 8, 264b1–6: (A.2.3.V) Argument from Contrary States

And furthermore there is also the following argument, which is more specific to the subject than those that have been stated. For jointly what is not white has perished and it has become white. So if the alteration to white and from white is continuous and it does not remain ⟨white⟩ for

264b2

- b₅ *some time, jointly what is not white has perished and it has become white, and it has become not white; for the same time will be that of (all) three.*

Analysis

The immediate conclusion here is (a) that what alters rests in the contrary endpoints of alterations (supplied), which, with (b) that locomotion is similar to alteration in this respect (supplied), implies the relevant result, that rectilinear movements are not continuous. Aristotle here supports (a) by *reductio ad absurdum*, arguing (a.i) otherwise the alteration of something to white and from white is continuous, and it does not remain (completely) white for any time (264b₃–4); but (a.ii) in that case, the time when it has become (completely) white, when the non-white has perished, and that when it has become not (completely) white, is the same (264b₅–6), since (a.ii.i) in that case, it begins to become not (completely) white as soon as it has become (completely) white (supplied), because (a.ii.i.i) it has become (completely) white just when the non-white has perished (264b₂–3; cf. b₅); and (a.ii.i.ii) in that case it begins to become not (completely) white as soon as the non-white has perished (supplied), assuming (a.ii.i.ii.i) the alteration of something to white and from white is continuous, and it does not remain (completely) white for some time (264b₃–4, = a.i above) – while (a.ii.i.ii) it has become not completely white as soon as it is becoming not completely white (supplied), because (a.ii.i.ii.i) when any movement is taking place, some movement has already occurred (supplied: see *Ph.* 6.5, 236a₇–b₁₉) – while (a.iii) it is impossible that the time at which it has become (completely) white is the same as that at which it has become not (completely) white (supplied; cf. 264b₅–6).

Commentary

Apostle (p. 335 n. 57) apparently thinks this argument assumes that, if the alterations from white to not white and from not white to white were continuous, they would have to be entirely contemporaneous, but the text does not support that, which is immediately self-contradictory. The question is whether they can be sequentially continuous, and Aristotle's argument depends upon the implication (under *reductio ad absurdum*) of the impossible co-incidences, at the endpoint, of (i) having become completely white, (ii) non-whiteness having completely perished, and (iii) having become not completely white (see 264b₅–6), more specifically because of the supporting co-incidences of (iv) becoming not completely white with (ii) and so (i), on the one hand and with (iii) on the other. Zekl (p. 291 n. 149) identifies the contradiction without explaining it. Aquinas (8.1127) claims it involves contemporaneous destruction and generation of the non-white, but this seems mistaken (Aquinas glosses Lat.

888 *corruptum est ... factum est* with *corruptitur ... generatur*); Alexander (frs. 764–765 Rashed) implies the same, but the contradiction is rather between being completely, and not being completely, white, between which the perishing of the non-white functions as a middle term: see *a.ii.i* and *a.ii.ii*, and cf. 264b2–6. Simplicius (1306.14–18) also seems wrong to identify the absurdity as that of the subject changing into precisely what it is changing from (yet at 1305.38–1306.2, 5–6 he states the contradiction correctly, and cf. Philoponus 847.10–18). On Bowin's account (p. 338 n. 29) of this argument, see the *Commentary* on *II.1.I*, above (262a31–b8, pp. 239–240), and cf. on *II.2*, above (262b22–263a3, pp. 245–246), and *A.2.2.2.I*, above (263b26–264a1, p. 260).

Notes

Aristotle's comment (264b1–2) that this argument is “more specific to the subject” (μᾶλλον οἰκεῖος) is problematic, since 264a7–9 contrasts the preceding arguments as οἰκεῖοι (i.e. physical) with the following, including this one, as dialectical (cf. *Note on Ch. 8*, 261b31–264b9: (A.2) *discontinuity of locomotion in a straight line*, p. 229), and *Ch. 8*, 264a7–9: (A.2.3) *introduction to the dialectical arguments*, pp. 263–264). Alexander (fr. 762 Rashed) or a scholiast calls it ‘demonstrative’, not explaining its use regarding locomotion. Simplicius (1305.23–35) says it appeals to the attributes of movement generally, whereas the previous two dialectical arguments appeal to contrariety, a more general principle; Aquinas (8.1127) claims it deals with the specific characteristics of generation and corruption (of white and non-white), relevant because any change involves a kind of generation and destruction. But either of the latter would include it in dialectical (general) arguments relating to all kinds of change. Perhaps Aristotle means it is a physical argument for what happens in alteration, which he applies now dialectically, by analogy, to the case of locomotion.

It is questionable whether **Premiss a.ii.ii** (supplied) is true, that something does cease to be completely white (and so has become not completely white) as soon as it is becoming non-white, even assuming the movement is continuous, precisely because there would have to have been a change in no time (to reapply Aristotle's argument): to have become (not completely white) is the result of the process of becoming (not completely white); thus if there were a distinct first moment of becoming so, the result would be at some later moment. At *Ph.* 6.5, 236a13–27 Aristotle reduces the conception of a first moment of becoming to that of a first moment in which any part has become (perhaps insofar as becoming is only evident in the achievement of some change), but denies there can be such a moment (some part of that change necessarily hav-

ing been achieved by some earlier moment); thus on his view there could not be a moment at which the subject begins to become non-white. But if there is no such moment, it does not do so at the same moment it has become white, even assuming movement is continuous. Today we might say becoming non-white proceeds by an infinitesimal separation from the moment of having become white, but Aristotle argues there must be a determinate endpoint to the state of being (e.g.) white (*Ph.* 6.5, 236a17–27), and cf. *Commentary to Ch. 8*, 262b22–263a3: (*Il.2*) *on the requirement to stop at an endpoint* (esp. pp. 247–249). From a modern perspective, in a way Aristotle is almost right, that there must be rest in being completely white, but in a way wrong (if we reject his denial of the actual infinite), since that rest need only be infinitesimal; thus on Aristotle's view the movement will be interrupted, because there is an actual division, however short, whereas on a modern view, since the infinitesimal is less than the distance between any two points in time, the movement is continuous. Graham (1999, p. 152) provides modern counterexamples to Aristotle's conception.

Ch. 8, 264b6–9: (*A.2.3.VI*) Argument from the Distinction of Contrary Extremes

264b6

Furthermore it is not the case that if the time is continuous, so is the movement; rather it is in series. But how could the extreme point of the contraries be the same, such as the extreme point of whiteness and blackness?

Analysis

This argument effectively responds to an objection (1) that movement to and from an endpoint is continuous (supplied), because (1.a) if time is continuous, so is movement (264b6–7) – Aristotle replies (2) that the movements are not continuous but in series (264b7), since (2.a) if the movements were continuous, the extremes, for instance of whiteness and blackness, would be the same (264b7–9), because (2.a.i) there is whiteness while something is becoming white, and blackness while it is becoming black (supplied); but (2.a.ii) the endpoint of whiteness (in this sense) would be the same as the beginning of blackness, if the movements were continuous (supplied) – yet (2.b) it is impossible that the extremes of whiteness and blackness are the same (264b7–9).

Commentary

Aristotle here argues that a reversed movement is not continuous but in series with its contrary. Ross (p. 716) following Simplicius (1306.33–1307.6) notes that

on Aristotle's definition (*Ph.* 5.3, 226b34–227a6; cf. 6.1, 231b8–9) what is in series is that which follows but without anything of the same kind in between, which is so if there is rest between two movements, and they do not share a limit (as does the continuous: 227a10–13). Thus Ross, followed by Wagner (p. 695), interprets 264b7–9 here as meaning by whiteness and blackness the two processes of becoming each, such that becoming white ends with complete whiteness, which must differ from the first moment of being (becoming) black. The latter is then the first moment at which any becoming black has already been achieved (see *Ph.* 6.5, 236a13–27, although there Aristotle denies there could be such a latter moment; yet even if, *per impossibile*, there were, on this argument it could not be the same as the former).

It would suit Aristotle's preceding usage better if 'whiteness' were understood, reversely, as the body's condition while becoming black (before being completely black), and 'blackness' the condition thereafter while becoming white. But in that case there is no last moment of whiteness on Aristotle's theory as the extreme point, apart from that when it *is* black (and not white). Admittedly the argument is dialectical, drawing consequences from a view attributed to the opponent, that there is an extreme point shared by whiteness and blackness, given that the opponent regards them as continuously changing; but since these alternative interpretations are otherwise interchangeable, going beyond the opponent's own views, it makes more sense for Aristotle to refute the more potentially coherent one.

By contrast, Graham (1999, p. 152), following Apostle (p. 335 n. 58) and Aquinas (8.1128), understands by whiteness and blackness the two contrary extremes, and the argument that since the ends are contrary, the movements to each must be different; this would be easier, if weaker; yet the term ἔσχατον (264b8: Lat. 889 *ultimum*), not τέλος (Aquinas: *terminus*) suggests Aristotle is referring to propinquitous limits whose separation immediately excludes continuity in accordance with the immediately preceding reference to being in series. Again, Themistius (231.6–9) also takes the colour references as to contrary extremes, apparently regarding this passage not as a separate argument, but a corollary absurdity from the previous argument, wherein the time of having become completely white is also *ex hypothesi* a time of having become to an extent black and so the limit of (that degree of) blackening.

Note

On 264b6–7, here *i.a.*, Aquinas (8.1128) notes at *Ph.* 5.4, 228b7–10 Aristotle allows that movements are not continuous just because time is; this is only one of several conditions for a movement's unity (cf. *Ph.* 5.4, 227b20–228a3 and *passim*); yet the opponent might argue that the others, unity of subject and

form of movement, are satisfied. The argument then reverts to the question of form of movement, here becoming white and becoming black.

Ch. 8, 264b9–21: (A.3) Continuous Unity of Locomotion in a Circle

The six Arguments I–VI just completed, against the continuity of reversing rectilinear locomotion (261b34–264b9), together form Section A.2 of the argument of the chapter's Part A (261b27–265a2), for the overall conclusion that rotation is the only continuous movement. Section A.3 argues that rotation can be continuous. For further discussion of the chapter's general structure see the *Introduction* (pp. 226–227).

264b10 *Movement on a circumference will be one and continuous. For nothing impossible follows, since what is moved from A will jointly be moved to A on the same projected course*¹³ *(for it is also in movement to that to which it has come), but it will not be moved jointly with contrary or opposed movements. For not every movement to this given point is contrary or opposed to movement from this point, although movement on a straight line is so contrary (for this involves contraries in place, such as the ⟨end⟩ points on a diameter, since these are most distant), whereas ⟨any⟩ movement along the same length ⟨as its reverse⟩ is opposed ⟨to that⟩. As a result nothing prevents there being a continuous movement that ceases for no time. For movement in a circle is from a point itself to itself, while movement in a straight line is from the point itself to another one. And movement in a circle is never in the same places, whereas that in a straight line ⟨and back⟩ is many times in the same places.*

b15

b20

Analysis

Aristotle concludes that locomotion in a circle can be one and continuous without limit (264b9, b17), because (a) nothing prevents something being moved from point A in a circle in one continuous movement without limit, without time intervening between revolutions (264b9–10, b17–18), since (a.i) what is moved from A will contemporaneously be moved to A on the same projected course (264b10–11), because (a.i.i) what is moved in a circle is also in movement to that point to which it has (already) come (264b11–12) – while (a.ii) it is only impossible for what is moved from a given point to be moved contempora-

13 See the *Note* on *πρόθεσιν* (264b11) following the *Commentary* (p. 276).

neously toward that point when it would be moved contemporaneously with contrary or opposed movements (supplied); and (*a.iii*) in being moved from and to A, what is moved in a circle is not moved contemporaneously with contrary or opposed movements (264b12–13), because (*a.iii.i*) not every movement to a given point is contrary or opposed to movement from that point (264b13–14), supported by two sub-arguments (see below), (*I*) from the absence of an opposed point (264b18–19), and (*II*) from the lack of return through intermediates (264b19–21) – although (*a.iii.ii*) movements that are not in a circle to a given point are contrary or opposed to movements from that point (supplied), as supported below (264b14–17).

The claim (*a.iii.i*) that not every movement to a given point is contrary or opposed to movement from that point (264b13–14: see immediately above), follows by Sub-argument *I* because (*a.iii.i.I.i*) movement in a circle is from a point to itself, while movement in a straight line is from the point itself to another (264b18–19); and (*a.iii.i.I.ii*) a movement from a point is only contrary or opposed to movement to that point when the former is a movement from the point itself to another (supplied) – and by Sub-argument *II* because (*a.iii.i.II.i*) movement in a circle is never in the same places, whereas that in a straight line (and back) is many times in the same places (264b19–21); and (*a.iii.i.II.ii*) a movement from a point is contrary or opposed to movement to that point when the latter is a movement back through all the same places (supplied).

For the claim above (*a.iii.ii*) that movements not in a circle to a given point are contrary or opposed to movements from that point (supplied, see paragraph before last), Aristotle argues (*a.iii.ii.i*) that (some) movement on a straight line to a given point is contrary to movement from that point (264b14), because (*a.iii.ii.i.i*) (some) movement on a straight line is between contraries in place (264b15), as (*a.iii.ii.i.i.i*) for instance, movement along the diameter of a circle between the endpoints is between contraries in place (264b15–16), since (*a.iii.ii.i.i.i.i*) the endpoints of the diameter are the most distant from each other on the diameter (264b16) – while (*a.iii.ii.ii*) movement along any length to some point is opposed (at least, if not contrary) to reversed movement along that same length from that point (264b16–17).

Commentary

As Simplicius (1307.15–18) notes, having shown already (A.2) that locomotion repeatedly reversing on a finite straight line cannot be continuous, Aristotle now argues that continuously repeated movement around a circle is possible because there is no reversal of direction. Aquinas (8.1129) treats this as the beginning of a new major section of the text, where Aristotle first provides arguments specific to the subject (physical arguments), and then (from Ch. 9,

265a27) dialectical arguments, for the continuity and cosmic primacy of circular locomotion (for this distinction in arguments see 264a7–9 and *Commentary* above, pp. 263–264).

Notes

Waterlow (1982, pp. 150–152) apparently refers to **264b10–14**, here *a.i.*, *a.i.i.*, *a.iii* and *a.iii.i.*, the description of point A on the circle as a point the moving body both recedes from and approaches in the same movement, contrasted with movement in a straight line, when she claims Aristotle thinks movement in a circle has a terminus that is, uniquely, not a stopping point, and that he is mistaken elsewhere to conflate the concepts of terminus and stopping point. But Aristotle does not call point A here a terminus, and for him it cannot be one, except as the limit of possible points in advance at the moment the body passes through A. As Philoponus (847.29) notes, a continuously rotating body is only moved from (and to) a given point A incidentally (unlike a body reversing direction at point A), since it is equally moved from (and to) any other point on the circle, and it does not stop and begin from any (cf. 262a19–b22: see above on *Argument II.1, the role of a midpoint*, pp. 235–238); the appeal to a point is here hypothetical, not committing Aristotle to the requirement for any terminus or limit in circular movement; cf. similarly Heath (p. 150). Wagner (p. 695) notes the contrast with 264a18–19 in *Argument A.2.3.III* above.

I understand *πρόθεσιν* (**264b11** here in *a.i.*) as ‘projected course’ with LSJ s.v. *προτίθημι* I.5 (cf. s.v. *πρόθεσις* II). Graham (1999, pp. 152–153) notes the difficulty, summarising ancient commentators’ explanations, but the particular context, and Aristotle’s generally teleological account of movement, makes the sense clear. As Apostle (p. 335 n. 59) puts it, the direction is always clockwise, or always anti-clockwise.

Regarding **264b13–17**, here *a.iii.i.*, *a.iii.ii* and the latter’s support, Ross (pp. 716–717), Cornford (1934, p. 392 n. a), Apostle (pp. 335–336 n. 61) and Graham (1999, p. 153) all suppose that Aristotle contrasts (i) continuing movement around a circle, (ii) the two rectilinear contrary movements along the diameter (between contrary extremes), and (iii) the reverse movement around the circumference (opposite to (i), but not contrary when the arc travelled either way is not a semicircle, because then the limits are not at the maximum possible rectilinear separation); alternatively, Aristotle might intend as (iii) reversed journeys along any arc except perhaps a complete circle, since the extremes of travel are not extremes of the circumference, and so not contraries; or more generally any reversed journeys along any path not between its extreme points; neither

Alexander (fr. 769 Rashed) nor Simplicius (1308.8–27) assume that Aristotle is thinking in (iii) specifically of the arc of a circle, Alexander (ap. Simplicius) suggesting he means that any reverse movement along a path between two points is opposed but not contrary, Simplicius movement along a straight path not between extremes.

Simplicius (1309.2–5) treats 264b18–19, here *a.iii.i.I.i*, as an independent argument for continuity of circular movement, stating that Aristotle here argues there is no actual point on a circular path at which what is moved comes to be and ceases to be, thus interrupting continuity of movement (while another point, to which non-circular movement from a point must proceed, before reversing, would function as an actual midpoint, dividing a path in two, as argued previously). But γάρ (264b18) seems better taken as introducing a reason for 264b13–14, here *a.iii.i*, than for b17–18, here *a*, despite its immediately following the latter, because that is clearly meant to follow from what precedes, and there is no indication that a second reason for this conclusion is now given.

Ross (p. 717), interprets ἐν τοῖς αὐτοῖς (264b20, b21, here *a.iii.i.II.i*), as “within the same limits” (cf. Apostle, p. 336 n. 62); but that is problematic given (i) πολλὰκις (‘many times’, b20–21), which on this view would have to imply many returns to each limit, together with (ii) the following claim (b21–22) that movement can be continuous that always comes to be “in different (limits? places?)”, clearly in a circle, which Ross must understand meaning the limits are those defined by present position on the circumference, so that, contradicting this interpretation, what is moved in a circle does come to be within the same limits repeatedly after each complete revolution. Ross follows Simplicius (1309.22–1310.26), following Alexander (fr. 770 Rashed), although (ap. Simplicius) Alexander asserts that Aristotle means a reversing body comes to be at the end-point twice each visit, once in arriving and again in departing, and so stops in between and does not move continuously. Cornford (1934, p. 393 n. b), justifying the similar Wicksteed-Cornford translation, “[directed] at the same points”, compares *Ph.* 6.9, 240a33–b7, apparently assimilating two distinct remarks there (πρῶτον μὲν ..., εἶτα ...), (i) that the parts of a rotating circle are for no time “in the same (place (cf. b31))” and (ii) that the path of the circle is constantly changing with respect to its starting (and on Cornford’s emphasis, finishing) point.

By contrast Graham (1999, p. 30 trans., and pp. 153–154), following Wagner (p. 695), translates “[in] the same stretches”, explaining the phrase as concerned only with the movement from a point and back to it—in the circular

case without, and in the other by, returning through all the same ‘stretches’ (although Graham misunderstands Cornford’s ‘at’ as local, criticising it since a repeatedly rotating body would come to be repeatedly at the same points); and similarly Aquinas (8.1131: *per eadem media*). It is easier to understand the reference as to places (cf. 240b33), notwithstanding Aristotle’s technical doctrine (262a19–b22), that what is moved does not actually come to be in places it passes through: the present argument is not ‘physical’, but ‘dialectical’. Thus the body returning along a straight path passes through any given place only twice, but there are many such places, continuous along the line. (Cf. the alternative gloss for ἐν τοῖς αὐτοῖς, “over the same ground” Ross, loc. cit., offers subsequently on 264b26, and Themistius 231.25–31).

Ch. 8, 264b21–28: (A.4) Discontinuity of Partial Circular Locomotion

264b21 *Now then, it is possible to be moved continuously with the movement that always comes to be in different places, but not with that which comes to be many times in the same places, since it is ⟨in that case⟩ necessary to be moved with opposed movements. As a result, neither in a semicircle nor on any other ⟨part of a⟩ circumference at all is it possible to be moved continuously. For it is necessary to be moved many times in respect of the same places, and to undergo opposite changes, since the limit does not join up with the beginning. But movement belonging to a circle joins up, and is alone complete.*

b25

Analysis

Aristotle argues that it is not possible to be moved continuously without limit in a semicircle, nor on any other part of a circumference (264b24–25), because (a) it is possible to be moved continuously with a movement that always comes to be in different places, but not with one which comes to be many times in the same places (264b21–23), since (a.i) a movement which comes to be many times in the same places must be that of something moved with opposed movements (264b23–24; cf. 264b19–21 above); and (a.ii) where there are opposed forms of change, there must be rest in between (supplied: see 261b34–264b9, A.2 above, p. 229; and cf. Ch. 7, 261a31–b22) – while (b) something moved in a semicircle or on any other part of a circumference must be moved many times in respect of the same places (264b25–26), because (b.i) it must engage in opposed forms of change (264b26–27), since (b.i.i) it must reverse direction each time it reaches the limit (supplied), because (b.i.i.i) the limit does not join

up with the beginning of its path (264b27); but (*b.i.i.ii*) movement in a circle joins up (with the beginning) and is alone complete (264b27–28).

Commentary

The relation of this passage to what precedes is slightly obscure. It begins with μέν οὖν, the μέν balanced by δ(έ) (264b22), and so might be taken as continuing the argument with an inference from b19–21 (in the previous passage); in that case the latter might be taken as part of the present argument: thus Simplicius (1309.17–1311.12); but b21–23, here *a*, does not follow from the former, and is independently supported, and καί (b19) would be a very unemphatic way to introduce a quite distinct argument (McKirahan, trans. of Simplicius p. 91, offers ‘further’), whereas transitional οὖν naturally introduces a second use in a new argument of the distinction between goals at b19–21 (cf. Denniston s.v. οὖν III.1, p. 426 “proceeding to a new point”).

Alexander (fr. 771 Rashed) explains the aim here well: the mere fact that locomotion is circular or rectilinear is not responsible for its continuity or not, but whether it retraces the same path, as reversing movement along any circular path must also do. For Simplicius’ interpretation cf. the *Notes* above to 264b18–19, and 264b20, b21 (pp. 277–278). Generally on the relation of this passage to context see the *Introduction* to the chapter (pp. 226–227), and cf. the introduction to the previous passage (p. 274).

Notes

On the expression at 264b21–23, here *a*, “movement that comes to be many times in the same places”, see the *Note* above on 264b20, b21 (pp. 277–278).

For the supplied **Premiss a.ii**, that where there are opposed forms of change there must be rest in between, see similarly Wicksteed (p. 394 n. *a*).

Ch. 8, 264b28–265a2: (A.5) Discontinuity of Other Movements besides Locomotion

And it is obvious from this distinction that the other kinds of movement cannot be continuous either. For in all of them it turns out that there is movement many times in respect of the same things, such as in alteration in respect of what is in between, and in change of size in respect of the intermediate magnitudes, and in generation and destruction similarly. For it makes no difference whether we make those things through which change occurs few or many, nor whether we place something in between

264b30

265a1

*or remove it, since in either case it turns out that there is movement many times in respect of the same things.*¹⁴

Analysis

Aristotle here concludes that no other kinds of movement (besides locomotion) can be unlimitedly continuous (264b28–30), because (a) in all cases there is movement many times in respect of the same intermediate conditions, (264b30–31), since (a.i) in alteration there is movement in respect of what is in between (264b31); while (a.ii) in change of size there is movement in respect of the intermediate magnitudes (264b31–32); and (a.iii) similarly there is movement many times in respect of the same conditions in generation and destruction (264b32–33), because (a.i/ii/iii.i) it makes no difference whether we make those things through which change occurs few or many, nor whether we place some (particular) thing in between or remove it (264b33–265a1), since (a.i/ii/iii.i.i) in either case it turns out that there is movement many times in respect of the same things (265a1–2) – and (b) wherever there is movement in respect of the same (intermediate) things, the direction of change reverses, and so there is rest at the endpoints (supplied).

Commentary

As Graham (1999, p. 155) observes, this argument aims to show all other changes are limited like rectilinear locomotion: being between extremes they must retrace their paths unless they stop permanently; thus they must stop temporarily at the extreme points. McKirahan (trans. of Simplicius, p. 171 n. 344) notes that Simplicius (1311.15–1312.27), having begun interpreting the references here to intermediates as meaning the endpoints of change (as his interpretation of 264b19–28 requires) is forced during his discussion to begin understanding them as midpoints between extremes (1312.7–8), which he does without comment, contradicting himself; Alexander (fr. 772 Rashed) maintains consistency only by interpreting τὰ μετὰξὺ (“what is in between”, 264b31) as the endpoints (between opposed changes).

Notes

On the expression in 264b30–33, here *a* and *a.i/ii/iii*, “movement many times in respect of the same conditions” see the *Note* to 264b20, b21 above (pp. 277–278). This argument overall appeals to a parallelism between traversing intermediate *places* in reverse while returning from an endpoint of locomotion and travers-

14 There will in any case be *some* intermediates: see the *Note* on 265a1–2 following directly.

ing a sequence of *states* of a subject in reverse while returning from an end-state reached, as a generic characteristic of non-continuous movement. This seems least obvious in generation and destruction, but there is an analogy between stages of generation and development and of natural decline and perishing: cf. the truism that old age is a second childhood; thus the latter process involves the same stages as generation in reverse; cf. Philoponus (848.5–11). Yet Aquinas (8.1132) explains this case as elemental generation, where between fire and air, each of which may become the other, there are intermediate dispositions, such as when hot material is no longer fluid (air), but is not yet dry (fire).

Regarding 265a1–2, here *a.i/ii/iii.i.i*, stating that in all reversible finite changes there is movement many times in respect of the same things, note there will always be *some* intermediates, since any movement is internally continuous and divisible. What they are depends on how we divide it in practice, but this makes no difference to the principle that the body returns through the same intermediates, and so must reach and stop at each extreme; cf. Graham (p. 155), and similarly Philoponus (848.12–21), noting it is true even though the endpoints are not traversed twice each time, and even if we added an extra section to the change for one passage only (his explanation of 264b33–265a1, here *a.i/ii/iii.i*).

Ch. 8, 265a2–12: (B) Rejection of the Theory of Continuous Flux, and Conclusion

After Part A of Ch. 8 has shown the only everlastingly continuous form of movement is rotation, this final passage, Part B, rejects older alternative theories of continuous movement (265a2–10). See the chapter *Introduction* (pp. 226–227) on the overall structure. This passage concludes by referring back to the chapter's main result, the conclusion to Part A (265a10–12).

So it is clear from this that those who account for nature by declaring that all perceptible things are always in movement do not in fact give a fine account. For things must be in movement in respect of one of these movements, and according to them they must be in alteration; for they say that they are always flowing and wasting away, and furthermore they call generation and destruction alteration. But the present account has stated generally about all movement that it is not possible to be moved continuously in respect of any movement except that in a circle, so that it is not possible in respect of alteration nor of growth. So let us take this

265a3

a5

a10

much to have been established by us, that no change is either limitless or continuous except transportation in a circle.

Analysis

This section concludes (B) that those who explain nature by claiming everything perceptible is always in movement are wrong (265a2–4), since (B.a) each movement must belong to one of the kinds of movement (265a4–5); and (B.b) these people assume everything is in alteration (265a5–6), for two reasons, (B.b.I) they (or some of them) say everything is always flowing and wasting away (265a6); and (B.b.II) they (or others) call generation and destruction alteration (265a6–7) – whereas (B.c) continuous movement is not possible either in respect of alteration or of growth (265a9–10), since (B.c.i) the present account has established generally about all movement that it is not possible to be moved continuously with any except circular locomotion (265a7–9; see Part A). Finally Aristotle ends the chapter noting he has concluded his demonstration (A) that only rotation can be continuous (265a10–12).

Commentary

Simplicius (1313.8–15) downplays this passage's importance, adhering to the Platonist doctrine with which he seeks to reconcile Aristotle, that perceptible things are always in flux, arguing that the rest between reverse processes is imperceptible. But comparison with other places where Aristotle concludes a major argument by referring to the doctrines of others indicates that his main rhetorical purpose is to differentiate his position and affirm its superiority over his predecessors' views.

Notes

Ross (p. 717) asserts that 265b6, here B.b.I, refers to Heraclitus, citing *Metaph.* 1.6, 987a32–34 (on his followers' claim that everything perceptible is always flowing). This is possible, but it presumably also refers to Plato, who according to Aristotle there adopted this view of perceptible things from Cratylus. Wicksteed (p. 394 n. b) notes that change in the sense of flux and decay could not be locomotion, and thus would have to be alteration.

Ross (p. 717) refers 265a6–7, here B.b.II, the claim that some people call generation and destruction alteration, to Anaxagoras, citing *Ph.* 1.4, 187a30 and *GC* 1.1, 314a13; cf. Cornford (1934, p. 394 n. c). Graham (1999, pp. 155–157) doubts Anaxagoras' doctrine is meant, since Aristotle's claim at *GC* 1.1, loc. cit., is that Anaxagoras, in his own terms, ought to have distinguished between becoming and alteration. If so, Aristotle's point here might be that the Ionians gener-

ally treated all becoming as alteration of a primary material, whereas Graham argues that actually they (or at least the earlier ones) did not, believing rather in continuous genuine becoming. Nevertheless it is doubtful whether we can specify the Ionians' 'real' beliefs in terms of a later distinction they did not recognise.

The Priority of Rotation

Introduction to Chapter 9

Having shown in Ch. 8 that only circular locomotion can be unlimitedly continuous, Aristotle now argues in Part *A* of Ch. 9 (265a13–b16) that this rotation is prior to other kinds of locomotion, using its unique continuity as a premiss at 265a27–28, although providing another demonstration of this (see 265a32–b8). In the slightly shorter Part *B* (265b17–266a6) he argues it is commonly accepted that locomotion *in general* is prior to other forms of movement (confirming the result of Ch. 7, 260a26–261a26). Although it follows, he does not explicitly draw the overall conclusion from Ch. 9, Parts *A* and *B*, that circular locomotion (identified with a sphere's rotation, 265b1–8), is universally prior to all other movements (stated by Simplicius 1313.29–30). The chapter concludes in Part *C* with an extremely brief summary of the results of the whole of Bk 8 to this point (266a6–9).

The argument of Part *A* for the priority of rotation to other forms of locomotion (asserted initially at 265a13) thus takes up most of this short chapter. The argument first establishes in Section *A.1*, as in Ch. 8, that rectilinear and circular locomotion are the two primary candidates (265a13–16), then gives five separate arguments in Section *A.2* that circular locomotion is prior to the alternative (265a16–b16), (*I*) that it alone is simple and complete (265a16–24), (*II*) that it alone can be everlasting (265a24–27), (*III*) that it alone can be continuously one (265a27–b8), (*IV*) that it is the measure of all other movements (265b8–11), and (*V*) that it alone moves at a constant speed (265b11–16).

Ch. 9, 265a13–16: (*A.1*) Reduction of all Locomotion to Straight or Circular

9, 265a13

a15

It is clear that transportation in a circle is the first form of transportation. For every form of transportation, as we stated previously,¹ is either in a circle or on a straight line, or mixed. But the former kinds must be prior

¹ *Ph.* 8.8, 261b28–29; with 265a15–16 here cf. 261b29–31.

to the latter, for it is constituted from them. And that in a circle is prior to that on a straight line, ...

Analysis

The overall conclusion *A* stated here, that locomotion in a circle is the first form of locomotion (265a13), follows since (*A.1*) rectilinear and circular locomotion are prior to other forms (supplied), because (*1.a*) locomotion is either circular, rectilinear, or a combination of these (265a13–15; cf. *Ph.* 8.8, 261b28–29; *Cael.* 1.3, 270b29–31); and (*1.b*) circular and rectilinear locomotion must be prior to a combination of these (265a15), since (*1.b.i*) a combination is constituted from circular and rectilinear locomotion (265a16) – while (*A.2*) circular is prior to rectilinear locomotion (265a16, the conclusion of the following section).

Commentary

Aristotle here divides locomotion into three kinds, as at *Ph.* 8.8, 261b27–31; see the *Commentary* there (p. 228) on the treatment of all other lines as combinations of straight and circular, and the obscurity in the sense of the term ‘combination’ (μίξις). Then he argues again that the simple kinds are prior to combinations, before arguing that circular locomotion is prior to straight. Below Aristotle distinguishes three relevant senses of priority (265a22–24): in nature, account and time. Zekl (p. 291 n. 156), identifies these with the senses distinguished at *Ph.* 8.7, 260b17–19 (but see the *Note* on 265a22–24 below, pp. 288–289), and claims the present sense is priority both in account and substantiality (completeness of form: cf. 261a13–23); but Apostle (p. 337 n. 2) states more plausibly that the priority of the simple forms of locomotion is in account and existence (i.e. order of being).

Ch. 9, 265a16–24: (*A.2.I*) Argument from Simplicity and Completeness

This is the first of Aristotle’s five arguments for the priority of rotation to locomotion in a straight line: see further the *Introduction* to the chapter (p. 284).

And that in a circle is prior to that on a straight line, for it is, by contrast, simple and complete. For on the one hand, it is not possible to be transported in an infinite straight line, for there cannot be what is infinite in this sense; and it is jointly true that even if there could be, nothing could be moved (over an infinite straight line), for what is impossible does not come to be, and it is impossible to traverse an infinite (line). And on the

265a16

a20

other hand, a movement that turns back on a finite straight line is composite and two movements, while if it doesn't turn back it is incomplete and impermanent. But what is complete is prior in nature, in account and in time to the incomplete, and the permanent is prior to the impermanent.

Analysis

The conclusion A.2, reprinted here from the previous passage, is that circular locomotion is prior to rectilinear locomotion (265a16), because (a) circular locomotion is both simple and complete (265a16–17); but (b) rectilinear locomotion is not both simple and complete (supplied: see 265a17), since (b.i) a movement on a straight line must be either infinite or finite (supplied); but (b.ii) it is not possible to traverse an infinite straight line (265a17–18), for two reasons, (b.ii.I) that there is no infinite length (265a18; cf. *Ph.* 3.7, 207b3–5, b15–21; 3.8, 208a21–22; cf. 3.5); and (b.ii.II) even if there were, nothing could traverse it (265a18–19), since (b.ii.II.i) what is impossible does not come to be (265a19); and (b.ii.II.ii) to traverse an infinite line is impossible (265a19–20) – while (b.iii) a movement on a finite straight line must either reverse direction at the end, or not (supplied); and (b.iv) a movement on a finite straight line reversing direction is compound (265a20–21), because (b.iv.i) it consists of two movements (not one) (265a21; cf. *Ph.* 8.8, 261b33–263a3) – but (b.v) a movement on a finite straight line not reversing direction is incomplete and impermanent (265a21–22) – whereas (c) what is complete is prior in nature and account and time to the incomplete, and what is permanent is similarly prior to the impermanent (265a22–24); and (d) what is simple is prior to what is compound (supplied).

Commentary

At 265a16–17, here *a*, the possibility of infinite rotation is not a separate criterion for priority, besides simplicity and completeness, contrary to the apparent implication of Ross's note (p. 718); contrast Argument II. As Ross says, Aristotle first proves (265a17–20, here *b.ii* and support) that, by contrast with rotation, movement over an infinite straight line is impossible, then (a20–21, here *b.iv* and *b.iv.i*) that reversing movements on a finite straight line are not simple, and finally (a21–22, here *b.v*) that non-reversing movement on a finite straight line ceases, and so is incomplete (while like the latter, the impossibility of traversing an infinite straight line implies its incompleteness). As Graham (1999, p. 158 with analysis) remarks, this takes the form of a complex dilemma. The key articulations are supplied here at *b.i* and *b.iii*: rectilinear locomotion is either infinite or finite; and either reversing or not. Apostle (p. 337 n. 1) notes that Aristotle lists

at the end of this argument the senses in which what is complete is prior to what is incomplete (such as movement in a straight line) as priority in nature, account and time: see further the *Note* on 265a22–24, here *c*, below (pp. 288–289).

The criterion for locomotive completeness is apparently self-sufficiency for continuity: cf. 265a25–27 in Argument *A.2.II* below, exemplified by the way the ‘end’ of a circle links up with the ‘beginning’: cf. *Ph.* 8.8, 264b27–28. Cornford (1934, p. 398 n. *b*) usefully refers to *Cael.* 2.4, 286b19, which defines the complete as that outside of which no part of itself can be found (cf. *Ph.* 3.6, 207a8–9). Similarly Ibn Bājja (216.3–218.6, cited in Lettinck, p. 624) and Aquinas (8.1134) understand the incompleteness of straight-line movement as the unfulfilled possibility of continuance beyond the end. Ibn Bājja adds the reason that rest completes rectilinear locomotion. Apostle (pp. 337–338 n. 7) suggests as one explanation that its potential, before that point, has not been completed by attaining its end; this either means the same as Ibn Bājja, or refers to the incompleteness inherent in the definition of movement (*Ph.* 3.1, 201a27–29), but then he would be mistaken, since this must also apply to rotation as movement; see further the *Commentary* on 266a6–9 below (pp. 301–302).

Simplicius (1314.14–15) understands 265a22 (cf. here *b.v*) as inferring incompleteness from impermanence, which is possible, but not explicit in the text, and Aquinas’ way of taking them as separate (since ceasing to be does not immediately imply any remaining unfulfilled possibility) is better. Graham (1999, p. 158) distinguishes the sense of simplicity here from that in which both uncombined forms of movement are simple (cf. 265a13–16, Section *A.1* above, pp. 284–285): it is rather that in which a reversing straight line movement is not simple, containing a plurality of single movements (265a20–21, here *b.iv*).

Notes

At 265a17, here *b*, terminal $\mu\alpha\lambda\lambda\omicron\nu$ signifies “rather than (sc. movement in a straight line being so)”, implying a negation in that case. Simplicius (1313.33–34) states that Aristotle proves at once that straight-line movement is neither complete nor simple, but this seems incorrect: a single locomotion between points would appear to be simple in virtue of being simply one, since it is one in each defining feature (*Ph.* 5.4, 227b23–228a3). See rather here the separate case for simplicity at 265a20–21, here *b.iv*. Philoponus (848.22–24) seems self-contradictory.

Where at 265a18, here *b.ii.I* Aristotle asserts there is no infinite straight line, Cornford (1934, p. 398 n. *a*), cf. Graham (1999, p. 58), observes that this is

because no line can be longer than the diameter of the bounded cosmos, according to Aristotle.

With 265a18–19, here *b.ii.II*, the claim that nothing could be moved over an infinite length, Graham (1999, pp. 158–159) compares *Ph.* 6.2, 233a31–b15 and 6.7, 238a20–31, where it is argued that in principle it is not possible to traverse an infinite magnitude in a finite time, but only in an infinite time. To complete the case here on that basis Aristotle would have to argue that what takes an infinite time is never completed; cf. Apostle (p. 337 n. 5). Note that this would not undermine the possibility of rotation for an infinite time, since that is always complete already; cf. 265a16–17, here *a*, with discussion above (p. 286), and esp. 265a34–b1, in Argument *III* below (pp. 291–294).

Explaining 265a21, here *b.iv.i*, the claim a reversing movement is not single, Apostle (p. 337 n. 6) notes *Ph.* 8.8 demonstrates that a body must rest before reversing, and thus these are two distinct movements. Cf. also *Cael.* 2.4, 286b13–18, arguing that the circle is primary among plane figures because it has one side, and unity is prior to plurality in each genus.

At 265a21–22, here *b.v*, ‘impermanent’ represents Aristotle’s *φθαρτή* (265a22): any movement along a straight line ceases to be when it reaches the terminus; cf. Apostle (p. 336 and n. 7), and Cornford (1934, pp. 398–399 n. c) for discussion of the modality of the terms *φθαρτόν* and *ἄφθαρτον* at a23–24, but note below a27 *ἔφθαρται* (“has ceased”), and cf. *Ph.* 8.1, 250b11–13. Cornford (1934, p. 398 n. b) observes that it is true, on Aristotle’s view, in the cases of both non-reversing and reversing movement (not just non-reversing ones, as Aristotle here states), that movement along a finite line is incomplete and impermanent, given the claim that reversing movement merely consists in a multiple of distinct single movements.

On 265a22–24, here *c*, Ross (p. 718) argues that the distinction among senses of priority (priority in nature, account and time) parallels that at *Metaph.* 9.8, 1049b10–12 distinguishing priority in substantiality, account and time (cf. 1049b12–1050b6), not, as Simplicius claims (1314.15–27; cf. Alexander frs. 774–775 Rashed, and Aquinas, 8.1134), the distinction at *Ph.* 8.7, 260b17–19 (cf. 260b19–261a23) among priority in nature, time and substantiality. *Contra* Simplicius (1314.24–26) and Alexander, priority in substantiality (end *qua* complete actuality) is also called priority in nature, whereas this could not be called priority in account, and the first sense of priority in *Ph.* 8.7 (cited above), despite the name, is not relevant here. Again, Argument *II* in the following

passage (265a24–27), that the everlasting is prior to the impermanent, also parallels *Metaph.* 9.8, 1050b6–24 (shortly after 1049b10–12, cited above). The reference to priority in account, explained correctly by Philoponus (848.25–29), has dropped out in Themistius (232.25).

Graham (1999, p. 159) explains the difference between the terms of comparison in *Ph.* 8.7 and those here in 8.9 as that the former concern ‘general’ or ‘ontological’ priority among kinds of movement, whereas the present passage is about priority in completeness (that is, in actuality, the subject of *Metaph.* 9.8); while roughly right, Graham overstates and simplifies: two of the terms of comparison remain effectively the same, completeness (‘nature’/‘substantiality’) and time, and only the remaining sense at 8.7 (the priority of a necessary condition, itself causally independent of what it conditions) is a kind of ontological priority distinct from the priority of what is naturally complete and a generative actuality, yet the latter is also an ontological sense of priority. I suspect Aristotle’s argument at such points is less principled and more dialectically motivated than Graham allows: Aristotle takes whatever distinctions can be easily turned to his purpose at the time. Nevertheless, as Graham shows, those applied here do fit his purpose: movement in a circle is prior to that in a straight line, according to him, in the sense that an incomplete natural form (i) only is what it is by reference to a complete one as its *τέλος* (*telos*), (ii) can only be explained in terms of the complete form, and (iii) the latter must precede it in time. Aristotle seems to think that the everlasting continuity of rotation is (i) a complete paradigm of continuity to which the finite continuity of a straight line is naturally a derivative incomplete approximation, (ii) whose limited extent, moreover, can only be explained by reference to what everlasting continuity is, while (iii) any finite movement in a straight line will, in virtue of having a starting point, be preceded by any rotation that, because of its completeness, is in fact everlasting.

Ch. 9, 265a24–27: (A.2.II) Argument from the Possibility of Everlastingness

Furthermore a movement which can be everlasting is prior to one which cannot be so. Then movement in a circle can be everlasting, but none of the others, neither transportation nor any other movement, can; for <in each of those cases> there must be a stoppage, and if there is a stoppage, the movement has ceased.

265a25

Analysis

The brief and straightforward argument here for the priority of rotation is that (a) a movement that can be everlasting is prior to one that cannot (265a24–25); and (b) movement in a circle can be everlasting, but no other movement at all can be (265a25–26; cf. *Ph.* 8.8), because (b.i) a stoppage must be involved with every other kind of movement (265a26–27); and (b.ii) if there is a stoppage, the movement has ceased (265a27).

Commentary

Cornford (1934, p. 396) in his summary of the chapter indicates that he does not see 265a24–27 as separate from the preceding argument; yet it does not depend on, or contribute to, anything there, and is introduced by ἔτι ('furthermore'), which normally begins a new proof in Aristotle. 'Then' (οὖν, a25), here in *b*, is thus transitional (to the minor premise), despite appearances, since nothing else in the context suggests Aristotle is here arguing from its priority that rotation can be everlasting.

Ross (p. 451) presents this as separate (cf. similarly Aquinas, 8.1135), and Graham (1999, pp. 159–160) wonders whether it is a corollary to the simplicity and completeness of rotation, or a new point. He also claims the cosmology still requires a demonstration of the actual everlastingness of rotation, while the claim here is just that only rotation *can* be everlasting. But this misconstrues the overall structure of the Bk 8.6–9: in Ch. 6, 259b32–260a19 Aristotle infers from the everlastingness of the first mover, and the argument that otherwise there could be no everlasting generation and destruction, that there is one first everlastingly moved body (esp. 259b33–260a1, cf. Ch. 7, 260a23–26); thereafter Chs. 7–9 address the questions raised initially in Ch. 7 (260a21–23). Thus the task here is to establish which, if any, form of movement can be everlasting, and show that this is the primary kind; it follows without further argument, once shown that this is rotation, that this is the first everlastingly moved body's movement. Again, Graham misrepresents the present argument's importance, suggesting wrongly that it establishes that rotation can be everlasting, but that is assumed to be true here (265a25–26, here *b*), following Ch. 8, not demonstrated: this passage only argues that no *other* movement can be everlasting (cf. Ch. 8, 264a8–b9), and it concludes that circular movement is prior to all others, not that it can be everlasting (cf. similarly Simplicius 1315.1–4).

Notes

Themistius (232.25–27) states the point of 265a24–25, here *a*, as that whatever movement could be everlasting, even if rotation were not, would be prior to any that could not. Aquinas (8.1135) offers as the reason, that the everlasting is

prior to the non-everlasting in time and nature. Ross (p. 718), as noted above on the previous passage, compares *Metaph.* 9.8, 1050b6–24.

For 265a25, here in *b*, stating rotation can be everlasting, Philoponus (848.30–849.6) supplies from the next argument (265a32–b1) the reason that there is no actual beginning, middle or end on a circle.

Ch. 9, 265a27–b8: (A.2.III) Argument from the Definition of Limits

*And it is quite reasonable that it has turned out that movement in a circle is one and continuous, and not that on a straight line. For the beginning, the end and the middle of movement on a straight line are defined, and the movement contains all of them within itself. As a result, there is a point from which what is moved will begin, and a point where it will end (for everything rests at the limits, either at the point from which it begins, or at which it ends), but these are undefined for circular movement. For why is any point at all on the line more a limit than any other? For each is equally a beginning, a middle and an end, so that (what is moved) is both always at the beginning and at the end, and never there.*²

For this reason a sphere³ is in a way both in movement and at rest; for it (always) occupies the same place. What is responsible is that each of these (boundaries) coincides with the centre. For that is the beginning, the middle and the end of the magnitude, so that because of this point being external to the perimeter, there is nowhere for what is transported to rest having completed its movement (for it is always transported around the middle, and not to the extreme point), and because this remains, in a sense the whole is both at rest and continuously in movement.

Analysis

Here the priority of rotation follows because (*a*) what is one and continuous is prior to what is not (supplied); and (*b*) movement in a circle is one and continuous, but that in a straight line is not (265a27–29), because (*b.i*) what is moved on a straight line begins from (rest at) one point and ceases (with rest) at another (265a30–31), since (*b.ii*) everything rests at its limits, either at the point from

² See the Note following on 265a34–b1 (p. 293).

³ ἡ σφαῖρα (265b2): Wagner (trans. and p. 696) gives 'die Weltkugel', but the article is probably generic, since the reasoning at 265b3–4 is mathematical, not cosmological.

which it begins or that where it ends (265a31–32); while (*b.i.ii*) the beginning, middle and end of movement on a straight line are defined, and the line contains them all in itself (265a29–30) – but (*b.ii*) a (freely rotating) sphere is in a way both in movement continuously, and at rest (265b1–2, b7–8; cf. *Ph.* 6.9, 240a29–b7), because (*b.ii.i*) there is nowhere for it to rest having completed its movement (265b5–6), since (*b.ii.i.i*) it is always transported around the middle, and not to an extreme point (265b6–7), because (*b.ii.i.i.i*) a rotating sphere is always both at the beginning and at the end of its path, and never there (265a34–b1), since (*b.ii.i.i.i.i*) the beginning, middle and end of the circumference are undefined (265a32), because (*b.ii.i.i.i.i.i*) no point on the circumference is any more a beginning, middle or an end than any other (265a32–33), since each point on the circumference is equally beginning, middle and end (265a33–34) – while (*b.ii.i.i.ii*) all the limit points on a sphere coincide with the centre (265b2–3), since (*b.ii.i.i.ii.i*) the centre is the beginning, middle and end of the magnitude of the sphere (265b3–4) – while (*b.ii.i.i.iii*) this point is external to the circumference (265b4–5) – and (*b.ii.ii*) the sphere always occupies the same place (265b2), since (*b.ii.ii.i*) the centre remains (in the same place) (265b7).

Commentary

Aquinas (8.1136) treats this as the first of three dialectical arguments, following the arguments specific to the subject, on the model of the distinction in Ch. 8 (264a7–9), presumably as a result of Aristotle's wording here (265a27–28), “it has turned out quite reasonably” (εὐλόγως); yet the present argument turns on features specific to rotation, in contrast to straight-line movement. Simplicius (1315.7–9) by contrast interprets this phrase as introducing the reason for what was demonstrated in the former two arguments. As Zekl (p. 292 n. 159) and Nussbaum (p. 295) each note, the second part of the argument (265b1–7, here *b.ii* and justification), while making general geometrical points, anticipates their application to the sphere of the fixed stars, in Aristotle's astronomical conception (cf. note on translation at 265b2 above).

Ross (p. 718) distinguishes in 265a27–b8 two ways of contrasting straight and circular lines: (i) the former have a beginning, middle and end, the latter none, and (ii) these are on a straight line, but in the circle's centre; yet as stated these are not consistent, and Ross is not strictly accurate. Aristotle establishes in the first case the fact that for the circle these points are undefined *on the line* (265a32, here *b.ii.i.i.i.i*): cf. both ἐν αὐτῇ (a30), removing Ross's comma before καί, and especially ἐπὶ τῆς γράμμης (a33). This Aristotle justifies by arguing, effectively, that if any of these were a point on the circumference, all would be equally each of them (a32–34). From that and the claim that all three points are at the centre (b2–3, here *b.ii.i.i.ii*), Aristotle infers that a rotating sphere does

not rest, as regards ever reaching the end of its path (b5–6, here *b.ii.i*); yet since the centre (and so the sphere) doesn't change place (b2, here *b.ii.ii*), it is both in one sense in continuous movement and, in another, at rest (b1–2, here *b.ii*); cf. *Cael.* 2.4, 287a12–23.

In Graham's analysis (1999, p. 160), his A (265a29–32) corresponds with *b.i* and his B (a32–b8) slightly less well with *b.ii*, since Graham omits representation of 265a34–b1, here *b.ii.i.i.i*, and its role, and ignores entirely the argument that a sphere is in one sense continuously at rest: see 265b1–3 and b7–8, here esp. *b.ii* with *b.ii.ii*. Aquinas (loc. cit., ad fin.) summarises the overall argument, (i) every movement never at its beginning or end is continuous, but (ii) circular movement is like that, thus (iii) it is continuous; (ii) then corresponds with 265a32–b1, here *b.ii.i.i.i* and justification, but this does not display the course of Aristotle's reasoning.

Notes

The treatment of 265a34–b1, here *b.ii.i.i.i*, claiming that a rotating sphere is always both at its path's beginning and end, and never there, accords with Ross's text and his interpretation of the sentence (pp. 718–719), following the commentators, omitting τινά (“any points you take”, Wicksteed, trans. p. 401, and cf. alternatives listed by Cornford, 1934, pp. 400–401 n. a). The justification in b32–34, here ultimately from *b.ii.i.i.i.i*, follows Ross (pp. 718–719): whatever point the moving body is at has as good a claim to the titles of beginning, middle and end as any other, and again, any such claim is arbitrary. Apostle (p. 338 n. 13) suggests this claim directly implies that, since the sphere is at the beginning and end of its path, it is at rest, and since it is never so, it is always in movement, assuming that 265a34–b1 directly supports b1–2, here *b.ii*. The order of the text only seems to support this if we ignore b2–3, here *b.ii.i.i.ii*, which shows that the sphere does not rest in the sense Apostle adduces: that would contradict the sense in which it is in movement, by rotating. Rather it rests because it remains as a whole in the same place (cf. Simplicius 1315.38–1316.3), as Apostle's next note (p. 338 n. 14) correctly states.

On 265a32–33, here *b.ii.i.i.i.i*, implying (at least) that *no* point on the circumference is a limit, Graham (1999, p. 161) follows Simplicius (1315.19–36) who finds an inconsistency with its justification (265a33–34), since the latter claims *all* points on a circle are equally potentially the limits; Graham also notes that this involves an appeal to a principle of sufficient reason. Yet there is no contradiction, firstly because 265a32–33 is actually a question, and, secondly, the implied answer means no point is *actually* a limit.

At 265b3–4, here *b.ii.iii.i*, claiming the centre is a sphere's beginning, middle and end, it is uncontroversial that the centre is the middle; Ross (p. 719) summarises the commentators' explanation: it is the beginning as the principle either of ideational generation (Philoponus 849.7–10) or definition (Themistius 233.1–2; Simplicius 1316.13–14), and the end as the remainder after contraction (Philoponus 849.10–12) or the terminus of all radii (Themistius 233.2–3, Simplicius 1316.14–15). Thus Graham (1999, p. 161) observes the basis for this claim is essentially a mathematical analysis. Wagner's apparent doubt (p. 696) about the text is unnecessary.

At 265b7, here *b.ii.iii.i*, asserting the centre remains in the same place, Cornford (1934, p. 400 n. 2) supports the majority MSS reading διὰ δὲ τοῦτο μένει (265b7), but I follow here Ross and the commentators, διὰ δὲ τοῦτο μένειν for his reasons (p. 719): the τε following in the line, linked with subsequent καί, must mean 'both' not 'and', and the argument is thus stronger. Cornford's rationale, that Aristotle's point is "not that the axis is stationary", is irrelevant: this is a reason, not the main claim (b7–8, for which see here *b.ii*). Graham follows Ross but mistranslates "because this body remains in motion": that is not a possible meaning or implied construction of μένειν (cf. LSJ s.v.); διατελεῖν would be required.

Ch. 9, 265b8–11: (A.2.IV) Convertibility of Priority and Being a Measure

265b8 *And the cases turn out to correspond. For in fact because rotation is the*
 b10 *measure of movements, it must be primary (for everything is measured*
 by what is primary), and because it is primary, it is the measure of the
 others.

Analysis

Treated as an argument that rotation is prior to other movements, the reasoning is (a) that the properties of being the primary movement and of being the natural measure of time and movement are mutually convertible (265b8), because (a.i) it follows from the fact that rotation is the measure of other movements that it must be the first (265b8–10), since (a.i.i) everything is measured by what is first (in its genus) (265b10); and (a.ii) it follows from the fact that rotation is the first movement that it is the measure of other movements (265b10–11) – while (b) the rotation of the sphere of the fixed stars is the measure of time and all other movements (supplied: cf. 265b8–9, b11).

Commentary

I follow Ross (p. 719) and older commentators who treat the opaque sentence at 265b8 as introducing a new proof. Graham (1999, p. 162) observes that it would more naturally foreshadow a conclusion following convertibly from the previous argument, but acknowledges that what follows does not. Apostle (p. 339 n. 21) notes the convertibility of being primary and being a measure involves only logical, not causal, equivalence (the cause of being a measure is being primary: Aquinas, 8.1137 seems to refer to *Metaph.* 10.1, 1052b18–27; cf. *Ph.* 4.14, 223b18–19).

A simplification of the underlying argument here then is that the rotation of the sphere of the fixed stars is primary (b9–10; and cf. *a.i* above), because (a) the properties of being the natural measure of time and the primary movement are convertible (b8; cf. b10); and (*b) the movements of the fixed stars are manifestly the natural measure of time and all other movements; while (*c) they move in circles (cf. 265b8–9: *b and *c together = b above).

For b Ross and Cornford (1934, p. 401 n. d), following Simplicius (1316.28–31), refer to *Ph.* 4.14, 223b18–20; that passage seems to infer from (d) the conclusion here that the diurnal cycle of the stars is the primary movement (assumed), by a (the convertibility premiss), to b, that it is the measure (of all movements, and equally time), but then adds the apparently subsidiary reason (e) that the number of this is most knowable; but it is unclear whether this is a second independent reason for b, or perhaps a direct reason for d, given that what is most knowable is first (cf. *Ph.* 1.1, 184a16–23). Either way, there seems to be an opposed direction of inference from the present, although at 265b10–11, here *a.ii*, apparently by way of illustration, Aristotle also gives this reverse inference, from d to b. Cf. also *Cael.* 2.4, 287a23–30.

Ch. 9, 265b11–16: (A.2.V) Argument from Constancy of Speed

But furthermore only movement in a circle can be even. For things on a straight line are transported unevenly from the beginning and to the end, for everything is transported (by nature) faster the further it departs from (unnatural) rest, but there is no natural beginning or end within itself of movement in a circle, and instead it is external.

265b12

b15

Analysis

Here rotation is shown to be prior to rectilinear locomotion, because (a) what moves naturally with constant speed is prior to what moves naturally with varying speed (supplied); and (b) only movement in a circle naturally has con-

stant speed (265b11–12), since (*b.i*) what is moved naturally in a straight line is moved with varying speed from beginning to end (265b12–13), because (*b.i.i*) everything moved naturally in a straight line moves faster the further it is from its starting point (265b13–14; cf. *Ph.* 5.6, 230b24–25; *Cael.* 1.8, 277a27–b10; 2.6, 288a20–23), since (*b.i.i.i*) the more it approaches its natural goal, the less it is under the retarding influence of what previously held it in an unnatural place (supplied) – while (*b.ii*) only for movement in a circle is there no natural beginning or end within itself (265b14–15), because (*b.ii.i*) the beginning, middle and end of movement in a circle are external to the circumference (265b15–16), since (*b.ii.i.i*) they are at the centre (supplied: cf. 265b2–3).

Commentary

Ross (pp. 719–720) explains the proposition that what is moved naturally in a straight line accelerates (265b13–14, here *b.i.i*), not as an observation of (what we call) gravitational attraction, but an inference from Aristotle's assumption that an elemental body is moved naturally away from a place where it was constrained by unnatural force, from whose influence it recedes (cf. Simplicius 1317.25–28 and 1317.33–1318.7, with alternative explanatory hypotheses; note he calls this a matter of belief, 1317.22); yet the theory is also meant to explain observable movement (cf. similarly Kouremenos, p. 27 n. 17). Aristotle probably had incidental natural appearances in mind: smoke accumulating around a fire before rising, a ball or rock slowly gathering speed on a hillside, or a leaf fluttering in the air before falling.

As Apostle (p. 339 n. 22), following Aquinas (8.1138) observes, Aristotle also recognises the obverse phenomenon: in his terms, that what is moved unnaturally slows as it progresses by force toward an unnatural place (*Ph.* 5.6, 230b24–25), a passage Graham (1999, p. 162) seems to have overlooked. Simplicius (1317.18–21) adds other kinds of unnatural movement: something thrown slows down, but something pulled speeds up (contrary to Aristotle's rule). Owen (p. 323) observes that where at *Ph.* 7.5, 249b30–250a9 Aristotle introduces proportions for forced movement he nevertheless assumes constant velocity (perhaps thinking only in terms of horizontal movement). Graham also contrasts Aristotle with Newton, for whom natural movement in a straight line (in the absence of force) is at constant velocity, and draws the parallel that for each thinker constant velocity characterises the primary kind of locomotion, whichever it is; yet given the comprehensive difference in world views, point by point comparisons alone do not reveal much. As Apostle notes (p. 339 n. 23, cf. Aquinas 8.1138), for Aristotle the reason movement in a circle should not accelerate or decelerate would be that it is never closer to either its beginning or ending point; cf. also *Cael.* 2.6.

Ch. 9, 265b17–266a1: (B.1) Confirmation by Opinions of Natural Philosophers

Introductory Note

In Part B as a whole (265b17–266a6) Aristotle argues that the priority of locomotion generally to other kinds of movement is confirmed both by Presocratic views (265b17–266a1, here Section B.1), and also by common linguistic usage (266a1–5 in B.2). Wagner (p. 696) compares the *ad hominem Ph.* 8.7, 260b7–13. As Graham (1999, pp. 162–163) notes, the Presocratics do not confirm the priority of rotation, which they typically treat as derived, in the cosmos as a swirling vortex. But if locomotion is generally prior to other movements, and rotation is prior to rectilinear locomotion and any mixed kind, which Aristotle has established in Part A, then it is prior to all other kinds of movement too. Graham also remarks (cf. Simplicius 1318.14–15) that the confirmation by other thinkers of the priority of locomotion is subsidiary to his arguments from his own principles at Ch. 7, 260a26–261a26. According to Simplicius (1318.15–18), possibly following Alexander (since Alexander fr. 781 Rashed = Simplicius 1318.10–13), Aristotle justifies this kind of rhetorical practice as due to nature itself leading these thinkers towards the truth (see McKirahan, trans. of Simplicius, p. 172 n. 373 for references).

All those who have made mention of movement bear witness that transportation in place is the first of movements. For they attribute the beginnings of it to those things that incite this kind of movement. For separation and blending are movements in place, and love and strife incite movement like this.⁴ For the one separates and the other of them blends. And Anaxagoras says that in fact the intellect that first incited movement separates things. And similarly also all those who deny there is any such responsibility, and assert that there is movement because of the void.⁵ For in fact they say that nature is moved with movement in place (for movement because of the void is transportation and, as it were, in place), and they think that none of the other forms of movement belong to the first principles, but only to what arises from them. For they assert that when the indivisible bodies blend and separate, things grow and shrink and are altered.

265b17
b20
b25

⁴ This refers to Empedocles' doctrine: see the *Note* below on 265b20–21 (p. 299).

⁵ The atomists: see the *Note* below on 265b23–24 (p. 299).

b30 *All those too who arrange generation and destruction by condensation
and rarefaction speak in the same way.⁶ For they organise this by blending
and separating. And furthermore besides these those who make the soul
responsible for movement do so.⁷ For they say that what moves itself is the
266a1 principle of things being moved, and an animal and everything ensouled
moves itself with movement in place.*

Analysis

Aristotle here claims that all those who have discussed movement confirm that locomotion is the first kind (265b17–18), since (a) they all attribute its starting points to things inciting locomotion (265b18–19), because (a.i) separation and blending are forms of locomotion (265b19–20); and (a.ii) (according to Empedocles) love and strife incite separation and blending (265b20–21), since (a.ii.i) he claims one of them separates and the other blends things together (265b21–22) – while (a.iii) Anaxagoras says the intellect, which first incites movement, separates things (265b22–23); and (a.iv) those who assert there is no such explanation, but claim things are moved because of the void, also speak similarly (265b23–24), because (a.iv.i) they assert the atoms are moved in place (265b24–26), since (a.iv.i.i) they say movement because of the void is locomotion (265b26) – while (a.iv.ii) they think that no other kind of movement occurs in the atoms, but only in what is constituted from them (265b27–28), since (a.iv.ii.i) they say growth and shrinkage, and alteration, occur when atoms join together or separate (265b28–29) – and (a.v) those who arrange generation and destruction through condensation and rarefaction speak similarly (265b30–31), since (a.v.i) they explain these in terms of blending and separation (265b31–32) – furthermore (a.vi) those who make the soul the cause of movement also speak like this (265b32–33), since (a.vi.i) they say what moves itself is the principle of things in movement (265b33–34); while (a.vi.ii) animals and everything ensouled move themselves with locomotion (265b34–266a1).

Commentary

Simplicius (1318.30–31) notes that the first two referred to, Empedocles and Anaxagoras, each identified a specific cause or causes of movement, whereas the atomists Aristotle refers to next (and the earlier Ionians then mentioned) did not. The last listed, Plato, identifies self-moving soul as the cause of movement.

6 Anaximenes and possibly others: see the *Note* below on 265b30–31 (p. 299).

7 Plato and his followers: see the *Note* below on 265b32–33 (p. 300).

Notes

Ross (p. 720) notes that **265b20–21**, here *a.ii*, refers to Empedocles' doctrine that love and strife are the causes of the mixing and separating of the four elements, citing B26.5–6 (= B17.7–8). Graham (1999, p. 163) also cites B8. Cf. *Ar. Metaph.* 1.4, 985a21–31. Simplicius (1318.25–28) also quotes B31.

With **265b22–23**, here *a.iii*, cf. Anaxagoras B12 and 13, *Ar. Ph.* 3.4, 203a19–33, and 8.1, 250b24–26.

265b23–24, here *a.iv*, as Ross (p. 720) notes following Simplicius (1318.31–1319.5), refers to the atomists Leucippus and Democritus (cf. 68B168, also *Ar. Ph.* 4.1, 208b26–27, *Metaph.* 1.4, 985b4–20, and McKirahan, trans. of Simplicius, p. 172 n. 378 for further references). The phrase represented here “because of the void” (διὰ + acc., 265b24, b26) may have originally meant “through the void” (but see LSJ s.v. B.I “of Place, only Poet.”). Graham (1999, pp. 163–164) suggests the void could be construed as the absence of a material cause stopping atoms moving, but admits the evidence and logic of their position rather suggests they claimed locomotion is intrinsic to atoms (cf. 265b24–26 with Alexander fr. 784 Rashed = Simplicius 1318.33–1319.2; and *Ph.* 8.1, 252a32–b5).

Note Aristotle's wording at **265b26**, here *a.iv.ii*, “for movement because of the void is transportation and, as it were (ὡς), in place”: movement in the void cannot be strictly in place, for Aristotle, since place is always occupied and there is no void: a place is always that of something, itself dislodged by the movement of what moves through or into the place, and in whose own original place something else comes to be (*Ph.* 4.1–9); cf. similarly Graham (1999, p. 163), Apostle (p. 339 n. 29). Yet Aristotle needs to assimilate the atomists' conception of movement in the void to movement in place, because he defines locomotion (i.e., ‘transportation’: φορά, *phora*) as change of place (*Ph.* 5.2, 226a32–b1), and he claims here their agreement to its priority among movements.

The reference at **265b30–31**, here *a.v*, to those who appeal to condensation and rarefaction, is identified by Ross (p. 720) as to the school of Anaximenes, comparing *Ph.* 1.4, 187a12–16; to explain the plural Cornford (1934, p. 404 n. *a*) suggests Aristotle associates Thales and Heraclitus with Anaximenes, with which Graham (1999, p. 164, with reference) agrees, given Aristotle's twofold division of types of cosmologists (roughly, pre- and post-Parmenidean), despite only Anaximenes himself explicitly holding this view (see references at McKirahan, trans. of Simplicius, p. 173 n. 381). Graham (1999, p. 165) further questions the

consistency of 265b31–32, here *a.vi*, Aristotle's interpretation of rarefaction and condensation as forms of separating and blending, given that the latter pair represent post-Parmenidean pluralism's competing explanation of generation and destruction.

For the reference at 265b32–33, here *a.vi*, to the Platonic theory that self-moving soul causes movement, Ross (p. 720) refers to Plato *Phaedrus* 245c–246a; Graham (1999, p. 165) adds *Laws* 10.895a–b. Aristotle either misrepresents Plato here, or at least equivocates: at *Laws* 10.896e–897b the original movements are psychic affections, and bodily responses are secondary, although *Timaeus* 37a–c, 43d–44c does identify cognition with rotation of the soul's circles of same and different. In any case, the efficacy of Aristotle's division of a self-mover into unmoved mover and moved body depends on ignoring psychic movement, or reinterpreting it as externally caused (cf. *de An.* 3.9–11, *MA* Chs. 6–10). Aristotle here assimilates the position that what moves itself is soul (see 265b32–33, here *a.vi*) to the claim that it is the ensouled (and embodied) animal (cf. 265b34–266a1, here *a.vi.ii*), in accordance with his own hylomorphic psychology. Solmsen (1960, p. 246) observes the Platonic theory of the soul is only explicitly referred to in the *Physics* here, but note Solmsen also argues generally for Aristotle's concern with Platonic doctrines and themes, and their influence on him throughout his natural philosophy. As Waterlow (1982, p. 239 n. 26) admits, Aristotle's language here is evidence that his own view is not that soul is the first cause of movement. Accordingly the prime mover is not the soul of the sphere it moves.

Ch. 9, 266a1–5: (B.2) Confirmation from Common Usage

266a1 *And we say that only what is moved in place is moved in the authoritative*
 sense; but if it rests in the same place, and grows or shrinks or happens to
 a5 *alter, we say it is moved in a way, but not simply moved.*

Analysis

Aristotle here concludes that locomotion generally is prior to other movements because (a) normal language use treats locomotion as the only authoritative sense of the term 'movement' (κίνησις, *kinēsis*; 266a1–2), because (a.i) it implies alteration and change of size are movement in a way, but not movement simply as such (266a2–5).

Commentary and Note

Here 266a2–5, introduced with $\delta(\acute{\epsilon})$ ('but') could be treated as co-ordinate with *a*, but it seems to introduce a distinction in usage from which *a* follows. Graham (1999, p. 166) gives references for Aristotle's conception of language as "embodying universal experience".

Ch. 9, 266a6–9: (C) Summary of Results of the Overall Inquiry

So it has been established that there always was and will be movement throughout all time, and what the principle of everlasting movement is, and further what the first movement is, and what movement can alone be everlasting, and that what first incites movement is unmoved. 266a6

Analysis

Here Aristotle states that he has now shown:

- (1) that movement was and will be for all time (266a6–7: see *Ph.* 8.1–3);
- (2) what the principle of everlasting movement is (266a7: see *Ph.* 8.4–6);
- (3) which movement is first (266a7–8: see *Ph.* 8.7, 260a20–261a26, and 8.9);
- (4) which movement can alone be everlasting (266a8: see *Ph.* 8.7, 261a27–b26, and 8.8);
- (5) that what first incites movement is unmoved (266a8–9: see *Ph.* 8.5–6 and cf. 8.10, 267a21–b5, b9–17).

Commentary

Regarding the overall results of Ch. 9 and what precedes it, Graham (1999, pp. 166–167) asks in what sense everlasting rotation is properly movement for Aristotle, since it does not proceed from a starting point to an end (cf. *Ph.* 5.1, 224b1–10, 224b35–225a2), and notes that if the possibility of traversing an infinite straight line is rejected because it cannot reach its end (cf. 265a18–20; see above under Ch. 9, 265a16–24: *Argument (A.2.I) from simplicity and completeness*, pp. 285–289, esp. p. 288), then the possibility of infinite movement in a circle could be rejected. Aristotle's answer to the first question is presumably to be derived from his explanation that rotation differs from other movements by being (by definition) around its true beginning and endpoint, the centre (265a32–b8, see above under Ch. 9, 265a27–b8: *Argument (A.2.III) from the definition of limits*, pp. 291–294). Then since, on this account, rotation does have a beginning and end, by contrast with the case of traversing an infinite line, which is impossible because it is unachievable, we could respond to the second

point that everlasting movement in a circle is continuously finishing a complete rotation at every moment.

Waterlow (1982, pp. 249–254) raises a much more significant question on this very basis: if rotation is always complete, in what sense does it satisfy the definition of movement at *Ph.* 3.1 (e.g., 201a27–29) as the activity of a potential? Note in Aristotle's defence that a rotating body always has further potential for positions ahead of it, as well as having already completed all the potential for the positions behind, so it is never short of potential. The metaphysical implication is that rotation is not an entirely complete activity (cf. *Metaph.* 12.7, 1072b4–8). This seems to weaken Waterlow's argument that Aristotle ought to have accepted the activity of the first sphere of the cosmos as a complete activity, obviating the need for an everlasting unmoved mover as the prior cause of that activity, given that he treats the complete activity of the latter as self-sufficient for its existence in *Metaph.* 12.7–9. Waterlow charges that Aristotle's motive for introducing the prime mover is a philosophically unnecessary theological one, but Aristotle could respond that if a rotating body must always have further yet-to-be-fulfilled potential it cannot be the self-sufficient source of cosmic change, and some other kind of being without any potential, a purely complete activity, must be the prior cause of its activity.

Notes

The claim at 266a6–7, here 1, to have demonstrated that movement was and will be everlastingly, appeals to *Ph.* 8.1–2, together arguing that there always was and will be things in movement. *Ph.* 8.3, confirming this by excluding both everlasting universal motionlessness and the position that each thing is always in movement, raises the questions whether there is also anything always at rest and anything always in movement.

The claim at 266a7, here 2, to have shown what the principle of everlasting movement is, appeals to *Ph.* 8.4–5, establishing that any movement is ultimately caused by an unmoved mover, and 8.6, that there must be an everlasting and absolutely unmoved mover that causes the first everlasting movement.

The claim at 266a7–8, here 3, to have shown which movement is first, appeals to *Ph.* 8.7, 260a20–261a26, establishing that locomotion is the first kind of movement, and 8.9, that rotation is the primary kind of locomotion, then confirming the former point.

The claim at 266a8, here 4, to have shown which movement can alone be everlasting, appeals to *Ph.* 8.7, 261a27–b26, establishing that no other form of

movement besides locomotion can be everlasting, and 8.8, that only rotation can.

The claim at 266a8–9, here 5, to have demonstrated that what first incites movement is unmoved, appeals to *Ph.* 8.5–6 (where Ch. 6 shows that the first mover of the whole cosmos is everlastingly unmoved); here there is some overlap with claim 2 at 266a7, and cf. 8.10, 267a21–b5, b9–17 below.

The First Mover and First Moved Body Again

Introduction to Chapter 10

Ph. 8.10 seems like the culmination of the book, given its proof that the prime mover is immaterial (begun in Part *A*, 266a10–b27, concluded in Part *D*, 267b17–26), a result prefiguring the theology of *Metaph.* 12 (see especially 12.7, 1073a5–11). Aquinas (8.1141, 1160, 1164) regards *Ph.* 8.10 as primarily an account of the prime mover, and Simplicius (1358.1–2) summarises the chapter's results as that this is proven to be one, unmoved and without parts (i.e., immaterial); cf. also Zekl (p. xlv).

Yet perhaps this conclusion is rather a deferral: it shows that the prime mover's nature and attributes do not come within the scope of physical science, since physics is a μέθοδος (*methodos*) concerning beings in movement, and so corporeal (cf. Wagner, p. 667, on *Ph.* 8.1, 251a5–8). The only divinity properly within its scope is the everlasting sphere continuously rotating at the cosmos's edge. Note also Alexander (fr. 788 Rashed), differing subtly from Simplicius' paraphrase (1321.3–5) in emphasising equally (with the proof of the first mover's immateriality), as Aristotle's aim in Ch. 10, to demonstrate the manner of the first movement (n.b. Alexander's μέν ... δέ ..., where Simplicius subordinates the latter). Aristotle argues in Part *C* (267a21–b17) that this sphere, and so implicitly *not* the whole cosmos, as Plato had written (*Ti.* 34a, 36e, 37c; cf. 38e–40b, *Lg.* 10.893c, *Phdr.* 246b–c), is the location of the primary everlasting movement; in effect Aristotle here recognises its divinity in its everlastingly simple movement, as the only object on which the prime mover directly acts (267b9). Immediately previously, leaving the proof of the immateriality of the first mover incomplete in Part *A*, in Part *B* (266b27–267a20) he detours to solve a particular problem for his theory of movement, the case of things thrown (see further below here).

Kouremenos (ch. 1) regards this chapter as a fresh start concerning the prime mover. According to him the arguments for the prime mover's immateriality, and unity as the cause of continuity of movement, and also the explanation of projectile motion, are all involved together in the disproof of a precise alternative conception of a prime mover, as *air*. For this Kouremenos (pp. 29, 33–34, 41) appeals to the claim at *Cael.* 3.2, 301b23–30 that air is the cause of elemental forced movement. He argues air plays a role in Aristotle's system equivalent to that of elemental interaction in Plato's *Timaeus* (esp. 57d–58c),

which is treated as a cause of cosmic movement, something Kouremenos thinks is the fundamental target.

But Aristotle has already identified the prime mover as motionless (*Ph.* 8.5–6), and the first movement as rotation (Chs. 7–9); so air cannot now be a candidate. Kouremenos (p. 34) resists this objection, claiming that the argument at 267b9–17 for an unmoved prime mover implies that previously in Ch. 10 Aristotle has not taken for granted earlier results; that is an extreme and unnecessary assumption without textual basis. The argument of 267b9–17 is sufficiently explained by its own context (see below on Part C), addressing the new question, what body undergoes the first movement. Overall Kouremenos' argument depends on interpreting Aristotle's general characterisations of rejected views as allusions to particular theories; but, if he had meant such theories, he could easily have referred to them directly, so as to make his points clearer, as he does elsewhere. Kouremenos also overlooks alternative possible targets for the doctrines Aristotle rejects (e.g. the atomists), and the likelihood that Aristotle's arguments are normally sufficiently explained by their role in establishing his own positive doctrines. On Kouremenos see further especially *Commentary* on 266a10–24 (*A/D.a.I.*, p. 313); 266a24–b5 (*a.II.i.I.*, p. 323); and 266b8–20, Subargument II (pp. 329–330).

Both Simplicius and Aquinas assume unquestioningly that throughout this chapter Aristotle conceives positively of his prime mover as possessing infinite power (δύναμις, *dunamis*). Where *Ph.* 3.4–8 rejects an actual infinite, the only examples relate to magnitudes and their attributes, but as Apostle (p. 340 n. 7) argues, Aristotle restricts his positive conception of the infinite to the incompleteness of processes of becoming (cf. *Ph.* 3.6–7, esp. 207a7–15, b21–35). If so, the Neoplatonic and Christian theologies of Simplicius and Aquinas, respectively, must misrepresent Aristotle's views.

The concept of infinite power here (see esp. 266a25, b5–6, cf. b14–15, 267b23–25) thus requires explanation, since it is plausible to think that an infinite potential to be moved requires for activation an infinite power to incite movement. Apostle (loc. cit.) suggests Aristotle uses the concept of an infinite power here only dialectically, as a concession to the opposed position, presumably that the prime mover is a body with motive power. In addition we can expand what Alexander, cited by Simplicius (e.g., 1358.18–26), said to explain the first body's infinite potential (passive δύναμις) to be moved, that this is only homonymously a δύναμις: just as this is not a potential in the same sense as a potential to undergo a finite change, since only a finite potential may be inactive, equally the prime mover's power is only homonymously an active δύναμις, since unlike an active power to cause a finite change, whose activation makes the mover weary and so is finite, the power (so called) of the prime mover is

not a strength wearied by activation. As we see from *Metaph.* 12.7, 1072b10–14, the simplicity and perfection of its nature, actuality itself, excluding anything unlimited (ἄπειρον, *apeiron*: infinite), directly elicits movement in the moved, and there is no other factor required that could be called its ‘power’.

Ph. 8.10 also solves a problem Aristotle regards as incidental to physics, the explanation of projectile movement (here Part *B*, 266b27–267a20); this seems required only to avoid the objection that, if something thrown remains in movement without continuous contact with what impels it, the continuous movement of the cosmos might possibly not depend on the first mover’s continuous influence. For Aristotle, the movement involved in throwing is merely a minor subcategory of unnatural movements caused by humans, itself a non-standard subcategory of all movements. Yet difficulties in Aristotle’s solution and the persistent appearance of a parallel with astronomical movements continued to provoke later thinkers until eventually the topic migrated to the centre of the subject of physics. The first significant step is Philoponus’ theory of impetus, a force transmitted by the thrower to the object thrown (see, e.g., Sorabji, 1988, pp. 227–239 with further references). This reconceptualisation ultimately required abandoning Aristotle’s twin but separate distinctions between forced and natural movements, and terrestrial and celestial movements, as well as his doctrine that a contemporary mover must cause movement, and eventually led to the concept of *momentum* and Newton’s first law.

There are then four parts to Ch. 10: Part *A* demonstrates two mechanical principles (266a10–b27), eventually applied in *D*, the final proof of the prime mover’s immateriality (267b17–26); Part *B* is the solution to the problem of things thrown (266b27–267a20); and *C* establishes the location and identity of the first moved body (267a21–b17). Solmsen (1961) argues that only *A* and *D*, the proof of the prime mover’s immateriality, properly belong at this point in the text. He asserts (pp. 274–275) first that the problem of things thrown (Part *B*) is unrelated to this; then that the argument for a single unmoved mover and the question of its place, as he takes it (267a21–b9, here within Part *C*) belong instead to the topic of Chs. 5–6; and finally that the argument for an unmoved mover from its mode of causation (267b9–17, here also within Part *C*), a separate passage according to him, similarly has no connection with the first mover’s immateriality. Solmsen notes (p. 277) that within 267b9–17 there is a reference back to the solution to the problem of things thrown (267b11–15), and so infers Part *B* too belongs, with the two sections in Part *C*, to the topic of Chs. 5–6. He suggests (pp. 277–282) they were originally afterthoughts Aristotle added at the end, moved to their present location by an editor inferring from Eudemus’ paraphrase that they belonged here, because at this point Eudemus discussed how an immaterial cause acts without pushing and pulling (see fr. 123a Wehrli)

while 267b9–17 also refers to pushing and pulling (267b10–12), but without connection to the topic of immateriality.

Seeck (pp. 143–144) goes further than Solmsen, arguing that Parts *B* and *C* are a later insertion, since at 267a22–23 (in Part *C* here) Aristotle infers the first moved body has magnitude because what lacks magnitude cannot be moved, and Seeck objects that this anticipates the subsequent conclusion to the argument for the incorporeality of the unmoved mover, not so far reached (267b18–19, b25–26, in Part *D*). But this description of the first body is unsurprising, as the chapter begins by foreshadowing this conclusion (266a10–11). Seeck also argues (pp. 145–148, and cf. p. 135) that nothing of what alone he thinks precedes the insertion, the proof of the prime mover's immateriality, is anticipated before Ch. 10, so we should see this as an appendix, not the text's climax. For his rejection as later additions of all passages in Chs. 5–6 suggesting the prime mover might be immaterial, see comments in the *Notes* (ad loc.).

This is all very speculative, and it seems better to make sense of the passages Solmsen has queried where they stand, if possible, as is done here. It is not unusual for Aristotle to introduce new topics in the course of what we consider one chapter, and then return to a previous topic later. In any case, the explanation of things thrown fits here as well as anywhere else, given that the two arguments for a single first mover are connected as support for the argument identifying the first moved body, as shown in the *Commentary* on Part *C*: this implicitly rejects Plato's doctrine in the *Timaeus*, and is a significant second culminating result, along with the immateriality of the unmoved mover. If any change of order were required, it might be better to place Solmsen's three passages together (266b27–267b17) either at the start of this chapter, before the proof of the first mover's immateriality, or alternatively after the conclusion of that: in the latter case it would seem that the real conclusion of Bk 8 is the cosmological answer to Plato, which, as elsewhere in Aristotle, is followed by the answer to a particular difficulty (267b9–17, Solmsen's third passage); this too might be taken as rejecting Plato's doctrine that the cause of celestial movement is self-moving cosmic soul.

Note on Ch. 10, 266a10–b27 & 267b17–26: (*A* & *D*) The Prime Mover's Incorporeality

The argument for the prime mover's incorporeality consists of two separated parts, introduced here in the opposite order to the text so the reader can appreciate Aristotle's overall strategy. He argues for the ultimate conclusion by exclusion of alternatives: the prime mover is indivisible, without magnitude or

parts (267b18–19, b25–27; cf. 266a10–11), because (a) it does not have a limited magnitude (supplied in Part *D*, and supported by Arguments *I* and *II*, from, respectively the effect, and the power, of a limited magnitude, each applying one of two mechanical theorems demonstrated in 266a10–b27, Part *A*); but (b) an unlimited magnitude is not possible (267b20–22, in Part *D*); while (c) any magnitude has to be either limited or unlimited (267b19–20). Cf. Judson (1994, pp. 169–170), noting the general argument is repeated at *Metaph.* 12.7, 1073a5–11.

Part *A* culminates in the two theorems as premisses, (*a.I.i*) that a limited magnitude cannot incite movement for an unlimited time (266a12–13, a22–24, cf. 267b23–24), and (*a.II.i*) that a limited magnitude cannot have unlimited power (266a24–26, b5–6, b25–26, cf. 267b22–23). In Part *D* it will then follow (a) that the prime mover does not have a limited magnitude, by Argument *I* because (*a.I.i*) a limited magnitude cannot incite movement for an unlimited time; but (*a.I.ii*) what first incites movement incites an unlimited movement for an unlimited time (267b24–25) – and similarly by Argument *II*, because (*a.II.i*) a limited magnitude cannot have unlimited power; but (*a.II.ii*) what incites the first movement must have unlimited power (supplied), because (*a.II.ii.i*) it causes an unlimited movement for an unlimited time (267b24–25; = *a.I.ii* above). See further on Part *D* below. Owing to the manner of the break in Aristotle's presentation between these two parts, in the interests of clarity there is some repetition and redundancy in its discussion in the *Commentary*.

In Part *A*, the subordinate stages of Arguments *I* at 266a12–24 and *II* at 266a24–b27 (cf. 267b22–25) make use of proportion theory. Moreover sub-arguments in *II* use some of the proportions between quantities of, respectively, (i) the mover's power, (ii) what is moved, (iii) the movement's duration and (iv) the movement's extent elaborated in *Ph.* 7.5 (also applied in *Ph.* 4.8 and *Cael.* 1.6), although Argument *I* does not use these latter, as shown below, contrary to some scholars (see below, pp. 309–319, esp. p. 317). Here Aristotle treats the mover's magnitude and power as distinct, at least conceptually, but 266b7–8 (in the first separate sub-argument for *II*) implies (a) that the mover's magnitude is not a variable independent of power, and yet (b) magnitude can only represent power (as in a given proportion to power) within a given species of mover. As Graham (1999, p. 170) notes, the true subject of a power is not strictly a magnitude, but a substance of that magnitude. Throughout the arguments here (iv), the extent of the movement, is treated as invariant, and it is excluded in the list of variables at 266a13–14 in *I* below.

Simplicius (1321.3–12) states that Aristotle aims here to demonstrate the prime mover's mode of causing movement is not bodily or by force (claiming the proportions here are restricted to forced movements, although n.b. *Ph.* 7.5, 250a28–b7). But Ch. 10 does not consider how the prime mover causes move-

ment (see rather *Metaph.* 12.7, 1072a26–b14). As Ross (p. 721) notes, denial of magnitude and divisibility (two correlated requirements for a physical body) to the prime mover implies that it is immaterial (pure form, and so analogous to the supposed status of Platonic forms); yet immaterial substance is a meta-physical conception not from physics itself, which concludes by excluding the prime mover *qua* incorporeal from further physical investigation.

Ch. 10, 266a10–24: (A/D.a.I) Argument from a Limited Magnitude's Effect

We should now establish that the latter (i.e. what first incites movement) must be without parts and have no magnitude, determining first those points that are prior to this. One of these is that nothing limited can incite movement for an unlimited time. For there are three factors, what incites movement, what is moved, and third, that in which, the time. And these are either all unlimited, or all limited, or some are, such as the (first) two, or the (first) one. Now let A be what incites movement, B what is moved, and unlimited time be that to which C applies. Now let D move some part of the line B, to which E applies. It does not move it (to the same extent) in a time equal to C, for it moves what is larger in a greater time. As a result the time, called F, is not unlimited. Now adding to D, I will use up A, and to E, B. But I will not use up the time (C) by always removing an equal part, for the time is unlimited. As a result, the whole line A will move the whole line B in a time that is a limited part of C. Thus it is not possible for something to be moved with an unlimited movement by something limited. So it is obvious that it is not possible for what is limited to incite movement for an unlimited time.

Introductory Note

At the start of the chapter here Aristotle states the general conclusion from Parts A and D, that what incites the first movement is indivisible and without parts or magnitude (266a10–11; cf. 267b18–19, b25–26). For the structure of the chapter as a whole see the *Introduction* (esp. pp. 304 & 306), and on the relation between Parts A and D see further the *Note on Ch. 10, 266a10–b27 & 267b17–26: (A & D) the prime mover's incorporeality* (pp. 307–309), preceding this passage.

Next Aristotle says here that he will “determin(e) first those points that are prior to this” (266a11–12). These mechanical theorems are the highest level conclusions of Part A, identified in the *Note* above as *a.I.i*, that a limited magnitude cannot incite movement for an unlimited time, stated here immediately

(266a12–13; cf. a22–24, and 267b23–24), and *a.II.i*, that a limited magnitude cannot have unlimited power, stated initially in the following passage (266a24–26; cf. b5–6, b25–26, and 267b22–23). In Part *D*, *a.I.i* is conjoined with *a.I.ii*, that what first incites movement incites an unlimited movement for an unlimited time (267b24–25), completing Argument *I*, directly supporting *a*, that the prime mover does not have a limited magnitude; see further the *Note* referred to above, and the *Commentary* on Part *D* below.

The rest of the present passage goes to support *a.I.i*. It can be divided into two hierarchically ordered parts. The first part (266a13–16) gives the immediate support for *a.I.i*, a set of four premisses, among which *a* to *c* introduce a model with terminology for its factors, and then Premiss *d* instantiates *a.I.i*, to the effect that a limited magnitude *A* takes only a limited time to move a limited magnitude *B* to a given extent; the second part of the passage (266a17–24) then argues at greater length for *d* in the terms of the model specified.

Analysis

Aristotle argues that a limited magnitude cannot incite movement for an unlimited time (266a12–13, a22–24; cf. 267b23–24), because (*a*) three factors must be involved in movement: (i) what incites movement, (ii) what is moved, and (iii) the time during which the movement occurs (266a13–14, cf. *Ph.* 5.1, 224a34–35); and (*b*) in principle each of these could be either limited or unlimited (266a14–15); accordingly (*c*) let *A* be a limited magnitude causing movement, *B* a limited magnitude being moved, and *C* an unlimited time (266a15–16, cf. 266a19–20); and (*d*) in that case *A* will move *B* to any given extent in a limited part of time *C* (266a21–22).

[Then in the second part of the passage *d* is supported by three main premisses, each supported by a sub-argument; given the complexity, these sub-arguments are presented in separate paragraphs with some repetition for convenience.]

Aristotle argues (*d*) that *A* will move *B* to any given extent in a limited part of time *C* (266a21–22), because (*d.i*) if *D*, a part of *A*, moves *E*, a part of *B*, to the same extent as *A* moves *B*, then the time it will take, *F*, is limited (266a17, a18–19), because (*d.i.i*) any quantity less than an unlimited one is limited (supplied); and (*d.i.ii*) the time *F* is less than *C* (266a17–18), since (*d.i.ii.i*) *D* must move *E* to the same extent in a time less than it would take to move *B* (supplied), given (*d.i.ii.i.i*) that *E* is a part of *B*; and (*d.i.ii.i.ii*) a given agent would move something larger to the same extent in a greater time (266a18) – but (*d.i.ii.ii*) *D* could not take longer than *C* to move *B* to this extent (supplied), since (*d.i.ii.ii.i*) there is nothing greater than what is unlimited (supplied) – and (*d.ii*) there is a numerical ratio greater than or equal to that of the time *H* (in which

A moves B to this extent) to F (the time in which D moves E to this extent) (supplied; see below for support); but (*d.iii*) there is no numerical ratio greater than or equal to that of time C to any part of itself (supplied; see below for support).

[Two main premisses now support *d.ii*, each of which follows by argument that is mathematically straightforward, but whose logical structure is extensive although repetitive; the argumentative strategy is not obvious except in terms of ancient mathematical techniques, which is why so many premisses are supplied here.]

It follows (*d.ii*) that there is a numerical ratio greater than or equal to that of the time H (in which A moves B to this extent) to F (the time in which D moves E to this extent) (supplied), because (*d.ii.i*) there is a numerical ratio greater than or equal to that of G (the time in which D would move B to the same extent) to F (supplied), since (*d.ii.i.i*) the ratio of G to F is proportional to that of B to E (supplied); and (*d.ii.i.ii*) there is a numerical ratio greater than or equal to that of B to E (supplied), because (*d.ii.i.ii.i*) adding E repeatedly to itself, I will use up B (266a19–20), since (*d.ii.i.ii.i.i*) by adding E repeatedly to itself I will eventually reach or surpass any limited magnitude (supplied: cf. *Ph.* 3.6, 206b9–12); and (*d.ii.i.ii.ii*) B is a limited magnitude (see *c* above) – while (*d.ii.ii*) there is a numerical ratio greater than or equal to that of H (the time in which A moves B to the stated extent) to G (the time in which D moves B to this extent) (supplied; support follows immediately).

It follows (*d.ii.ii*) that there is a numerical ratio greater than or equal to that of H (the time in which A moves B to the stated extent) to G (the time in which D moves B to this extent) (supplied), since (*d.ii.ii.i*) the ratio of H to G is inversely proportional to that of A to D (supplied); and (*d.ii.ii.ii*) there is a numerical ratio greater than or equal to that of D to A (supplied), because (*d.ii.ii.ii.i*) adding D repeatedly to itself, I will use up A (266a19–20), since (*d.ii.ii.ii.i.i*) by adding D repeatedly to itself I will eventually reach or surpass any limited magnitude (supplied: cf. *Ph.* 3.6, 206b9–12); and (*d.ii.ii.ii.ii*) A is a limited magnitude (see *c* above).

[The sub-arguments for *d.i*, that if D, a part of A, moves E, a part of B, to the same extent as A moves B, then the time it will take, F, is limited (266a17, a18–19); and *d.ii*, that there is a numerical ratio greater than or equal to that of the time H (in which A moves B to this extent) to F (the time in which D moves E to this extent) (supplied), are now complete; to this we must add the sub-argument for *d.iii*, that there is no numerical ratio greater than or equal to that of time C to any part of itself (supplied), in order to support the overall argument's primary Premiss *d*, that in that case A will move B to any given extent in a limited part of time C (266a21–22).]

It follows (*d.iii*) that there is no numerical ratio greater than or equal to that of time C to any part of itself (supplied), since (*d.iii.i*) by subtracting any part repeatedly from C, I will never use up C (266a20), since (*d.iii.i.i*) the time C is unlimited (266a21, cf. *c* above).

Commentary

It will be seen that from *d.i*, that, if D, a part of A, moves E, a part of B, to the same extent as A moves B, then the time it will take, F, is limited (266a17, a18–19), together with *d.ii*, that there is a numerical ratio greater than or equal to that of the time, H (in which A moves B to this extent) to F (the time in which D moves E to this extent) (supplied), and *d.iii*, that there is no numerical ratio greater than or equal to that of time C to any part of itself (supplied), it then follows (*d*) that A will move B to any given extent in a limited part of time C (266a21–22).

It will also be seen that from *d.ii.i*, that there is a numerical ratio greater than or equal to that of G (the time in which D would move B to the given extent) to F (the time D takes to move E to the same extent) (supplied), together with *d.ii.ii*, that there is a numerical ratio greater than or equal to that of H (the time in which A moves B to the stated extent) to G (the time in which D moves B to this extent) (supplied), it follows that (*d.ii*) there is a numerical ratio greater than or equal to that of the time H (in which A moves B to this extent) to F (the time in which D moves E to this extent) (supplied). For further explanation see the final paragraph of the *Note* below on 266a17–24 (pp. 317–318), following the discussion of variant interpretations, and the *Notes* below on 266a17–18 (pp. 318–319) regarding the proof of *d.ii* and 266a19–20 (p. 319) regarding the proof of *d.ii*.

Themistius (233.25–29) and Simplicius (1321.19–21, 26–33), presumably following Alexander (fr. 790 Rashed), and cf. Aquinas (8.1142), state that this first argument concludes with the claim that no limited *power* (not *magnitude*) can incite movement for an unlimited time (at 266a12–13 and a22–24; cf. here *a.I.i*). Themistius and Simplicius both think Aristotle argues that a limited magnitude must have either limited or unlimited power, showing here that it cannot have a limited power, and thereafter (266a24–b5), in the first sub-argument for *a.II.i*, that no limited magnitude has unlimited power. Aquinas similarly says that Aristotle first shows that infinite power is required for infinite movement, then that there cannot be infinite power in a finite magnitude.

Ross (p. 721) rejects this, arguing that at 266a12–13 and a22–24 Aristotle must mean no limited *magnitude* causes unlimited movement, since (i) he does not mention power until 266a24–26 in the following argument, (ii) ὅλως (266a24, ‘overall’) implies that the second claim, argued for there, that unlimited power cannot be in a limited magnitude, is a generalisation of the former, not an

independent point as Simplicius thinks, (iii) in the summary at 266b25–26 only the second point, and a third, that no unlimited magnitude contains a limited power, are mentioned, suggesting the first is not independent, and (iv) in the ultimate summary at 267b22–24 the wording restating the first point implies it refers to a magnitude, not a power. Ross explains the statement at 267b22–24 of both the second, then the first, as of a general principle, then the particular application relevant to the overall result that the prime mover cannot have magnitude.

In addition to Ross's arguments, (v) the first argument depends on the conception of adding quantities of something limited together to produce a further quantity (266a19): that is uncontroversial for magnitudes, but Aristotle is careful in the subsequent argument first to define relative quantity of power by reference only to comparison of its external effect (a26–28) before conceiving of adding such quantities together (a33–b1), which strongly suggests the first argument does not yet assume any conception of a measurable quantity of power (*contra* Simplicius 1321.33–37).

While the *Analysis* here follows Ross in recognising two distinct arguments, here they are treated as independent and parallel (see further the *Note on Ch. 10*, 266a24–b27: (*A/D.a.II*) *Argument from a limited magnitude's power*, pp. 319–320, with pp. 320–333 and 353–355). Zekl (p. xlv) says this argument is a development from that of *Ph.* 6.7, where Aristotle shows that neither does a finite movement take an infinite time, nor an infinite movement a finite time.

Kouremenos (pp. 24–26) infers that Aristotle here (i) treats the prime mover as unmoved yet (inconsistently) in movement with what it moves, since Argument *I* applies the proportions of *Ph.* 7.5 requiring such an agent, and (ii) treats the movement as rectilinear, since it must be bounded; and thus (iii) the conclusion, he thinks, effectively re-establishes the result of *Ph.* 8.8–9, that the continuous, everlasting movement caused by the prime mover is not rectilinear. This interpretation is misleading and confused: regarding (i), Argument *I* has no particular dependence on the detailed results of *Ph.* 7.5 (see below, the *Note on 266a17–24*, esp. p. 317), and there is no explicit restriction here to locomotion (the partitions involved could apply to growth or alteration, although locomotion generically is the model here); regarding (ii), bounded rotation is just as possible a subject as rectilinear locomotion, and in any case that a finite magnitude causes finite movement is merely a corollary of the result that the time is finite, contrary to Kouremenos' interpretation (see further the *Note on 266a17–24*, pp. 315–317); and regarding (iii), the implication of the conclusion is the reverse of his account: because it has already been shown that the first movement is everlasting (and therefore rotation), Aristotle can here conclude its mover is not a limited magnitude.

Ross (p. 722), followed by Heath (p. 151), criticises Aristotle for not distinguishing between causing a movement that then continues for unlimited time, and acting for an infinite time and causing movement throughout. But Aristotle's treatment is consistent with his principle that a movement only occurs while a cause acts on a body (producing below, 266b27–267a20, the problem of thrown things); thus he would reject Newton's first law of motion. (Heath, p. 152, wrongly identifies this law at *Ph.* 4.8, 215a20–22, which only implies a body hypothetically in a vacuum, without any natural place, would either continue interminably with random movement, or else remain at rest: that is, no principles could explain its behaviour.)

Aristotle would reject the concept of 'motion' as a primitive bodily attribute or behaviour (contrasted with his own dynamic understanding of movement or change, κίνησις, *kinēsis*), arguing that an account of things moved must be grounded in an account of their natures, since a movement is relative to a natural goal, and that κίνησις cannot be a simple attribute since there can be no becoming or ceasing to be of κίνησις itself (*Ph.* 5.2, 225b13–226a23). Then speed is not an immediate attribute either, but derivative of time and distance, which vary with a mover's power, and the resistive power of what is moved (cf. *Ph.* 7.5, 250a4–9); thus Aristotle would reject Menn's suggestion (p. 439) that the prime mover's power might be proportional to the first sphere's finite speed (not the duration of its movement). McLaughlin attempts to argue that Aristotle's requirement for a mover is consistent with Newton's first law by characterising purely inertial movement as incidental, thinking Aristotle's definition of movement applies to intrinsic movement alone; but McLaughlin's only concern is with adapting Aristotle's causal principle to a modern scientific context, not defending any wider features of Aristotle's physics, such as his doctrine of natural places, with which the principle of inertia is inconsistent (cf. 215a20–22, mentioned above).

Aquinas (8.1145) asks how a limited body like the sun causes elemental movement for an unlimited time; his explanation is that the prime mover's power to do so is primarily a power to move an unlimited body (although there is none); thus it is merely incidental that it can move a limited body for an infinite time by repeated rotation; but then a limited mover like the sun can also do this. Clearly this is not Aristotle's reasoning: the sun is a moved, not a first, mover (cf. 267b9–17 below) and its causal power derives from the actuality of its own everlasting movement, and that of its own mover (cf. *Ph.* 3.3, *Metaph.* 9.8, 1050b4–6), and so is not independent of the first mover's power.

Notes

Regarding 266a15–16, here *c*, specifying the model's factors, see the *Note on Ch. 10*, 266a10–b27 & 267b17–26: (*A & D*) *the prime mover's incorporeality*, above (p. 308), on Aristotle's general conception of proportional relations among these terms. He does not state initially that A and B are limited, but the *demonstrandum* requires a limited magnitude as cause of movement (cf. 266a12–13), and at 266a19–20 he clearly assumes both A and B to be limited. Note also that if B's movement continued for time C (forever), by *Ph.* 8.7–8 it would be rotation, but *Cael.* 1.5, 271b28–273a6 states no unlimited body can rotate; thus Aristotle must assume B is limited. C is identified not as the time A takes to move B to the given extent, but for comparison with that and with other finite times implied by the argument. The final section of the argument that the first mover has no magnitude, in Part *D* below, also appeals to the proof in *Ph.* 3.5 and 8 that there can be no unlimited magnitude (267b20–22), yet that result is suspended hypothetically later here in Part *A*, in Sub-Argument *II* from correlated limitation of magnitudes and powers (266b6–24) for Argument *II* that there cannot be a limited power in an unlimited magnitude.

Referring to 266a17–24, here the argument for *d*, Zekl (p. 292 n. 172) comments on its formal, non-empirical character. Actually it is a mathematical proof in proportion theory (cf. Owen, p. 331 with n. 117). Simplicius (1322.6–7), Philoponus (850.14), Abū l-Faraj (935.2–936.3, ap. Lettinck, p. 593), Ibn Rushd (*LC* 424B10–13), Aquinas (8.1142), Ross (pp. 722–723, cf. p. 452), Heath (pp. 151–152), Graham (1999, pp. 167–168), Kouremenos (p. 22), and possibly Themistius (233.26–29), all explain it on the assumption that A moves B to the given extent in (infinite) time C, but that is neither stated, nor required for the analysis: see rather 266a15–16, here *c*, and a19–22, here *d*, since the argument is not a *reductio ad absurdum*. Alexander's view is not evident in frs. 791–793 Rashed, but probably underlies the later ancient commentators.

The two main interpretations based on this mistake are those of, firstly, Simplicius (1321.37–1322.37) and Philoponus (850.10–18) followed by Heath (pp. 151–152), and, secondly, Cornford (1932, pp. 52–54) and Ross (pp. 722–723), each facing the problem that if

- (i) A moves B in C, while
- (ii) D and E are each the same fraction of A and B respectively, then
- (iii) D should move E in C too, contrary to Aristotle.

Simplicius, Philoponus and Heath thus deny (ii): D, a larger fraction, moves E in the finite time F; then understanding 266a18, here *d.i.iii.ii*, as that an object

greater in relation to its agent takes longer to be moved, they suppose Aristotle derives that A moves B in a longer time than D does E. They then face the problem of explaining how Aristotle derives that A moves B in less than C. Ross objects to the implausibility of Aristotle assuming without comment that D is a larger fraction of A than E is of B; he follows Cornford, interpreting 266a18 as instead showing that when D moves E, it moves it in a lesser time than that in which D would move B. The *Analysis*, especially *d.i.ii.i* (and see *Notes* below) shows the latter is part of the solution, but Ross's adoption of (i) and especially (ii) confuses the explanation, leading him to complain that Aristotle should see, then, that if D moves E in finite F then, given (ii), A will move B in F. But Aristotle doesn't state (ii), and it is not obvious or necessary: 266a17 only states that D (some part of A) moves some part of B (to the given extent) in some (finite) time; and A does not move B in F, but another related time (see below, pp. 317–318, and the *Analysis*, esp. pp. 310–312). Heath (p. 152) explains 266a18 as not referring specifically to D and E, but a general statement which, if applied to the agent D, would mean that it moved a body larger than E, but in proportion to B as D is to A in C. Heath (p. 152) does not say precisely how Aristotle shows by finite multiplication of D and E until they reach or surpass A and B respectively that A moves B in a finite time, unless it is as in the *Analysis* here, but that requires us *not* to assume (i) A moves B in the infinite time C.

Cornford (1932), and (1934, pp. 406–410 with notes) differs from Ross only in taking D as imagined to move B part by part (each equivalent to E), following his differing readings and interpretation of *Ph.* 7.5, 250a9–12. This appears to make easier the assumption that D moves B, given that 250a12–25 (at least, or on other readings a9–25) state the principle that if a given agent moves a given object to a certain extent in a certain time, it is not necessary that it could move a larger object at all. Owen (p. 330), for instance, thinks “however the argument is construed” the claim that an agent moves something larger in a greater time (266a18, here *d.i.ii.i.ii*), breaks this principle. But Owen seems mistaken: the argument is entirely hypothetical, given that it does not conclude to the instantiation of any greater proportional relations than those from which it begins, and where Aristotle actually introduces an additional proportion he explicitly postulates it (266a17); the further implied proportions can similarly be postulated.

Themistius (233.17–22, 26–29) gives a third interpretation, explaining 266a18 as that a greater power continues to act for longer (rather than the same power on a greater object), by implication in proportion to its size, so that even a very large finite power will only act for a finite time. This perhaps derives from Alexander (cf. fr. 795 Rashed, *ad* 266a26–27), and, transmitted by Ibn Rushd (*LC* 424B–D; contrast *SC* 147.5–149.16 in Lettinck, p. 656), is followed by

Aquinas (8.1142), who conjoins it with (ii) above, and reveals the mathematical mistake involved, stating, “an addition to a mobile object and to a mover requires a proportional addition to the time of the motion”: rather the time will remain unchanged given the constant proportion of mover to moved. Graham (1999, pp. 167–170) too thinks the argument depends on a thought experiment involving incremental increases at once to both D and E, such that F also increases incrementally according to some formula he cannot identify: see his (7), representing 266a19–20, here *d.ii* and justification. Note that Graham anachronistically misrepresents the letters signifying quantities as capable of indicating variables; thus, e.g., his (8) is incorrectly expressed. See the *Note* to 266a17–18, here *d.i.ii* (pp. 318–319), claiming F is finite, Graham’s (5), regarding his version of its premisses.

Kouremenos (p. 22) avoids the problems of earlier commentators by assuming that Aristotle means D moves E to a different extent from that to which A was said to move B, but Aristotle would have had to indicate that explicitly to make it intelligible. Adopting both (i) and (ii), as above, Kouremenos further assumes without textual warrant that D moves E, in finite time F, the same fraction of the distance A moves B as D and E would be of A and B respectively on (ii). He thinks Aristotle means that if $nD = A$, and $nE = B$, $nF =$ the finite time in which A will move B the whole distance. But there is no rationale given here for dividing A, B and the distance in the same proportions, or for dividing them at all. Since (ii) is inapplicable, Aristotle is not applying a generalised form of the fourth proportion from *Ph.* 7.5, 250a4–9, that if an agent of magnitude *a* moves a body of magnitude *b* distance *c* in time *d* then one half *a* will move one half *b* the same distance in the same time, contra Kouremenos (pp. 22–24) and Ross (p. 723).

There are actually two distinct and independent comparable proportions in the separate Premisses *d.ii.i* and *d.ii.ii* here, corresponding with the two parts of the first sentence at 266a19–20: by *d.ii.i*, there is a numerical ratio greater than or equal to that between the time (say G) in which D would move B, and the time F in which D moves E (i.e., $G : F$, where $G : F :: B : E$); and, by *d.ii.ii*, there is a numerical ratio greater than or equal to that between the time (say H) in which A moves B and the time G, as above (i.e., $H : G$, where $H : G :: D : A$). It follows immediately that there is a numerical relationship greater than or equal to that between H and F, such that H is finite, and not C. Confusion is quite excusable since Aristotle’s argument at this point appeals to the mathematically developed intuition of a student trained in proportion theory and the help of a diagram (see the following *Note* on 266a17); he assumes ability to recognise the particular argumentative method and all steps predictable thereby, and only briefly indicates the two proportions and their implications.

Thus the *Analysis* consists mainly of supplied premisses. Notwithstanding Simplicius' mistake regarding the first main premiss (see above), his exemplification (1322.18–1323.8) of the proportions shows he understands the method of proof (although McKirahan, trans. of Simplicius, p. 173 n. 404, notes one minor slip); Apostle (p. 340 n. 4) seems to follow this. Simplicius (1323.8–14) also adds another simpler proof on the same principle. See the *Note* following directly on 266a17–18 for elaboration of the proof of *d.i.ii*, and 266a19–20 on the proof of *d.ii*.

At 266a17, here *d.i*, the feminine τῆς indicates that, on a diagram Aristotle here refers to, the body B is represented by a line (γραμμῇ) indicating its extension, whereby a part may be defined (cf. Ross, p. 723). *Qua* part, Aristotle assumes E must be limited; the status of D is not yet specified, but 266a19 shows Aristotle means a part of A.

The assumption (**Premiss *d.i.i***) that any quantity less than an unlimited one is limited, is required, as Graham (1999, pp. 169–170) and Apostle (p. 340 n. 3) observe. This is consistent with Aristotle's concept of the infinite (*Ph.* 3.4–8), but contradicted in the treatment of transfinite cardinals in modern set theory, depending upon acceptance of an actual infinite, which Aristotle rejects, loc. cit.

The argument at 266a17–18 supporting **Premiss *d.i.ii***, that F (the time in which D moves E a given extent) is finite, can be expanded as follows: assume D had moved B this distance; given that D is a part of A, it cannot take less time than A, whether or not A takes the infinite time C; but if A took C, D must also take C, since there is no greater time, and if A took less than C, D either took C or at least a greater finite time which is still less than C. But D must move a part of B, i.e. E, that distance in a time less than this; so in either case in a time less than C. Cf. partly similarly Ross (pp. 722–723) following Cornford (1932, pp. 53–54), and cf. Cornford (1934, pp. 408–410 n. a), rejecting Simplicius' interpretation (1322.8–14) for which see above, the *Note* on 266a17–24 (esp. pp. 315–316); and cf. Apostle (p. 340 n. 2).

Aquinas' view (8.1142; cf. 1144) is that (assuming wrongly both that D and E are in proportion to A and B, and A moves B in C) D only moves E in less than C in that a leading part of what is moved takes less time than the whole to pass a given point (appealing to *Ph.* 6.5, 236a28–33, although that is hypothetical reasoning); similarly initially Wicksteed, but rejected by Cornford (1934, pp. 406–408 n. a). Graham (1999, pp. 167–169) represents the premisses supporting his (5), that the time F is less than C (266a17–18, here *d.i.ii*), as his (3), that a greater motion takes a greater time, and his (4), that motion ABC is greater than motion

DEF; (3) aims to represent 266a18, here *d.i.ii.i.ii*, but Graham wrongly denies this refers to a larger object moved, mistakenly thinking B cannot be increased (rather, the comparison is that B is larger than E; moreover τὸ μείζον cannot refer to κίνησις). There is nothing in the text corresponding to the comparison in Graham's (4) except what he agrees is the conclusion (a17–18), his (5), that the time F is less than C (moreover, F is not in any case meant necessarily to be the time A takes to move B: see the *Note* on 266a17–24 above, esp. p. 316).

I paraphrase the implied argument for **Premiss *d.ii*** at 266a19–20 as follows: if there are numerical ratios equal to or greater than those between D and A, and between B and E, then if D moves E in a finite time (F), it must move B, if it could, in a time (say G) whose ratio to F is proportional to the ratio of B to E; thus there is a numerical ratio greater than or equal to that between G and F, and thus G is a finite time. But if D moves B in G, then A moves B in a time (say H) whose ratio to G is inversely proportional to the ratio between A and D; but then $H : G :: D : A$. Thus there is a numerical ratio greater than or equal to that between H and G; but G is a finite time, and so H, the time A takes to move B, must be finite. For the phrase “a numerical ratio greater than or equal to”, cf. Simplicius (1323.17–26).

At 266a20, here *d.iii.i*, the claim that, by subtracting any part repeatedly from the infinite time C, I will never use up C, the part in mind is presumably F, but the point is general. Repeatedly removing equal parts continuously from the comparandum is equivalent to repeatedly adding equal parts together to reach a magnitude for comparison with the former.

Note on Ch. 10, 266a24–b27: (*A/D.a.II*) Argument from a Limited Magnitude's Power

This is the second of two separate arguments, each incomplete in Part A but contributing two key premisses supporting the overall conclusion in Part D that the prime mover is incorporeal. Premisses *a.I.i* and *a.II.i* appear in the final stages of their respective arguments in Part D for the interim conclusion (a) that the prime mover could not have a limited magnitude. See further above, the *Note on Ch. 10, 266a10–b27 & 267b17–26: (A & D) the prime mover's incorporeality* (pp. 307–308), and the *Introductory Note on Ch. 10, 266a10–24: (A/D.a.I) Argument from a limited magnitude's effect* (pp. 309–310).

The result supported here in Argument II by 266a24–b27 is *a.II.i*, that a limited magnitude cannot have unlimited power, stated at the beginning of the

following passage (266a24–26; cf. b5–6, b25–26, and 267b22–23). In Part *D* this is conjoined with Premiss *a.II.ii*, that what incites the first movement must have unlimited power (supplied), which follows directly there from *a.II.ii.i*, that it causes an unlimited movement for an unlimited time (267b24–25), in order to conclude (*a*) that what incites the first movement cannot have a limited magnitude.

In 266a24–b27, *a.II.i* is supported by two main arguments, *a.II.i.I* from the absence of time for movement (266a26–b5), and *a.II.i.II* from the correlated limitation of magnitudes and powers (266b6–25), on the converse ground that equally there cannot be a limited power in an unlimited magnitude (266b6–7, b26). The latter is supported by three further separate sub-arguments, (*I*) an answer to an objection (266b7–8), (*II*) from the non-exhaustion of power (266b8–20) and (*III*) by limitation of the magnitude (266b20–24).

Ross (p. 723), followed by Graham (1999, p. 170), cf. Sorabji (1988, p. 250), argues that ὅλως ('overall', 266a24, in the statement of *a.II.i*) indicates a generalisation of the previous claim (*a.I.i*) restated at 266a22–24 (the end of the preceding passage; cf. a12–13); this is true only insofar as the previous claim was equivalent to one asserting an infinite power in a finite body cannot cause a given movement over an infinite time (assuming any infinite effect requires an infinite power). See the *Commentary* on *Ch. 10*, 266a10–24: (*A/D.a.I*) *Argument from a limited magnitude's effect*, above (pp. 312–313), on the view of Themistius (233.29–234.7) and Simplicius (1324.1–5), that Aristotle previously proved what causes the first movement cannot be a finite magnitude with finite power and here proves a finite magnitude cannot have an infinite power. While Argument *II* here provides quite independent support for the claim (*a*) that the prime mover cannot have a limited magnitude, and its key Premiss *a.II.i* is itself justified in a different way from *a.I.i*, nevertheless the latter is implicitly assumed below in the supporting Argument *a.II.i.I*, 266a26–b5 (see *Commentary*, p. 323); so perhaps we could regard the present argument as in that respect, at least, a corollary of *I* above, although it would be unilluminating to display it here as such.

Ch. 10, 266a24–b5: (*a.II.i.I*) Argument from Absence of Time for Movement

266a25

But that it is not possible overall for there to be an unlimited power in a limited magnitude is clear from the following. For let the greater power be that which always does an equal amount in a lesser time, such as heating or sweetening or throwing or in general inciting movement. It

is thus necessary that what is affected is affected also by what is limited but has an unlimited power, and more than by something else. For the unlimited power is greater <than any other>. But it is not possible for this to take any time. For if there is a time, to which A applies, in which an unlimited strength heated or pushed (something to a given extent), but in AB a limited strength did so, by always taking a greater limited strength in addition to this, I will eventually come to its having incited the movement in A. For by always adding to something limited I will exceed any bounded quantity, and by removing I will in the same way make it less than any. Thus in an equal time to that in which the unlimited strength did so, a limited one will incite <the same> movement. But this is impossible; thus nothing limited can contain an unlimited power.

Analysis

Argument *I* concludes that (*a.II.i*) a limited magnitude cannot have unlimited power (266a24–26 cf. b5–6, b25–26, 267b22–23), because (*I.a*) any movement or change must take some time (supplied: cf. *Ph.* 5.4, 227b23–26); and (*I.b*) a limited magnitude with unlimited power could not take any time to move or change something (266a31), because (*I.b.i*) if there were a time A in which an unlimited strength heated or pushed something to a given extent, some limited strength would do so in the same time (266a31–33, b4–5), since (*I.b.i.i*) some limited strength would move the same thing to the same extent in the greater time AB (266a33); and (*I.b.i.ii*) as the limited power that causes the given movement in time AB increases incrementally, the time taken decreases proportionately, until there is a sufficiently great limited power to produce the movement in time A (or less) (266a33–b2), because (*I.b.i.ii.i*) by continual additions something limited eventually exceeds any limited quantity, and continual subtractions reduce it below any (266b2–4; cf. *Ph.* 3.6, 206b9–12); and (*I.b.i.ii.ii*) the time taken to produce a given degree of movement or change is inversely proportional to the power of the cause (supplied: cf. *Ph.* 7.5, 249b27–250a9) – while (*I.b.ii*) it is impossible for an unlimited power to cause the same movement in the same time as any limited power (266b5), since (*I.b.ii.i*) if there were a limited magnitude with unlimited power, what it affects would be affected more <quickly> than by anything else (266a28–30), because (*I.b.ii.i.i*) a greater power (by definition) is that which does an equal amount in a lesser time, such as heating, sweetening, throwing or in general inciting movement (266a26–28); and (*I.b.ii.i.ii*) an unlimited power is greater than any other (266a30).

Commentary

The conclusion follows from two main premisses, *I.a* and *I.b*, the latter supported by *reductio ad absurdum*, *I.b.i* postulating the absurdity and *I.b.ii* stating its impossibility, each depending on a sub-argument, together taking up the rest of the passage. The overall argument could be considered a dilemma (given that the effect of an unlimited power in a limited magnitude would have to take either no time, or else some time), each alternative rejected by *reductio ad absurdum*, the former immediately, the latter by the demonstration that if it takes some time, some limited power will produce the same effect in the same time: see *I.a*, *I.b* and *I.b.i* (i.e. 266a31–33), and similarly Simplicius (1324.17–29), although he suggests an argument where Aristotle gives none, for the first horn: if the unlimited power does not act in a limited time, then, as there is no ratio of an infinite to a finite power, and so none between the time the finite power takes for given effect and that the infinite power takes, it acts in less than the least limited time, and so in no time. This partly accords with Themistius (233.29–234.5), whose paraphrase however implies that this is an interpretation of the second horn, incrementally increasing the limited power and decreasing the time taken until the unlimited power and no time is reached (involving a conception of an actual infinite that Aristotle would not accept). Zekl (p. xlv) asserts generally, with less relation to the text, that the argument assumes that if any one of power, effect and time is infinite, the irrationality arises that the others become either nothing or indeterminable.

The *Analysis* here instead treats the first horn as directly implied by the disproof of the second (that the infinite power could take some time to act): see 266a31, here *I.b*. Alexander (fr. 796 Rashed), apparently presented the argument this way, although not supplying *I.a*, but adding as the reason an infinite power acting in no time is impossible, that then it does not act, so that a lesser power, impossibly, does more than a greater.

Aquinas (8.1146) doesn't recognise the dilemma, thinking Aristotle first argues that the infinite power in a finite magnitude must take some time, treating 266a31, here *I.b*, as an unsupported premiss, not also a conclusion of sub-argument (but cf. γάρ, 'for', introducing a31–b1, here *I.b.i* and support). Rashed's summary (p. 628) also concludes directly from the imagined case to the absurdity that a finite power would have the same effect as an infinite power, but without explaining a31, here *I.b*. Ibn Rush (LC 426A–G) is even further mistaken, thinking Aristotle here means the finite power has a lesser effect, and multiplies that effect up with the power to reach that of the supposedly infinite power. See rather Apostle (p. 341 n. 9) for an exemplification of the case in the second horn.

Kouremenos (p. 26 n. 15 and cf. pp. 71–72) denies this argument aims to show a finite body with infinite power cannot cause everlasting movement. This is misleading since, although the direct conclusion is that such a body cannot have unlimited power (266a24–26, b5–6, here *a.II.i*), the argument does contribute to this result. Again, Kouremenos asserts that the present argument shows that such a body cannot cause the fastest movement, but that is merely a subordinate result (266a31–33, b4–5, here *I.b.i*) contributing one of two key premisses, together with 266b5, here *I.b.ii*, to the proof of *a.II.i*. As Kouremenos (pp. 70–71) observes, the argument is essentially identical with *Cael.* 1.7, 275a14–24, but note the same two premisses occur there as in this argument (275a19–20 and a20). He interprets the conclusion that the change occurs in no time (26a31, here *I.b*), as meaning no finite time, which is misleading, since the argument concerns a change requiring a definite time (see *I.a*, supplied) and the *reductio* is of the assumption that there is any such time; no positive conception of an infinitesimal emerges from Aristotle's treatment (cf. 266a26–30, here *I.b.ii.i* and justification). Thus Kouremenos' suggestion (p. 72) is also wrong that Sub-argument *II* for Argument *II* below (266b8–20), rejecting an infinite body with finite power, supports the inference here that a finite body with infinite power would take no finite time; see the *Commentary* below (pp. 329–330) on his reading of Sub-argument *II*.

The present argument assumes (266a31, here *I.b* and justification), that the effect (over time *A*) was finite (cf. Cornford, 1934, p. 411 n. *a* cont'd, and Heath, p. 153); but Aristotle presumably claims this because he has previously demonstrated in 266a12–24, Argument *A/D.a.I* above, that it is impossible for something limited to cause an unlimited movement (movement for an unlimited time), and so hypothesizes here a limited cause of a limited movement, yet with unlimited power. Graham (1999, p. 171) illustrates by example the second leg of the dilemma (266a33–b4, here *I.b.i.ii*) and justification, comparing and contrasting the variables' relationships with the modern physical formula for power, but note the latter is specified exclusively for locomotion, whereas Aristotle defines a sense of power responsible directly also for other changes such as alteration (266a26–28, here *I.b.ii.i.i*).

Notes

Referring to 266a24–26, here the conclusion (*a.II.i*) that a limited magnitude cannot have unlimited power, Simplicius (1326.38–1340.8) devotes several pages to answering Philoponus' view that this principle means the world cannot be everlasting because the heavens, as a limited magnitude, must lack the potential for unlimited movement. Simplicius' answer distinguishes potentials to undergo an infinitely intense effect, and an effect *ad infinitum*, following

Alexander (ap. Simplicius 1327.35–1328.1) and Aristotle's account of the potential infinite (*Ph.* 3.6, 206a27–29); Ibn Rushd (*LC* 427B10–C8, and see Lettinck, pp. 591–593, 661–664 with further references) applies this distinction to an infinite active power, but then the question reappears why a potential to cause movement *ad infinitum* could not belong to a finite body: see Aquinas (8.1145), discussed above, in the *Commentary* to 266a10–24 (p. 314), and cf. Aquinas' concerns discussed in the *Note* on 266a31 directly below.

At 266a26–28, here *I.b.ii.i.i*, Alexander (fr. 795 Rashed) adds to Aristotle's definition of greater power as what causes the same movement as a lesser power in a lesser time “and moves the same object *⟨sc. at the same speed⟩* for a longer time”. For Alexander's possible motivation and influence see respectively the *Note* on a24–26 immediately preceding, and Themistius' explanation of 266a18 in the previous argument (see *Note* on a17–24, pp. 316–317).

At 266a30, here *I.b.ii.i.ii*, Aristotle defines an unlimited power as one greater than any other; Wagner (p. 699) seems to overlook this in his comment on the more explicit repetition at 266a19–20 below.

The claim at 266a31, here *I.b*, that an unlimited power cannot take any time to cause a finite effect leads the commentators to distinguish two senses of infinite power (see the *Note* directly above on 266a24–26). Aquinas (8.1150–1151) thus faces the problem (i) why the prime mover, with infinite power, causes movement for an everlasting time, and not for no time, if a limited magnitude with infinite power would cause a movement in no time, and otherwise (ii) why the argument's conclusion is not that there is no infinite power of causing movement at all. His first solution is that because the prime mover not a magnitude, his effect is not in proportion to his power, but his purpose; yet this is unaristotelian, assuming a deliberating creator. His second solution, derived from Ibn Rushd (*LC* 427F11–G3), that nothing with magnitude (e.g. the first heaven) is moved in proportion to the power of a mover without magnitude, since its capacity to be moved is limited by its own nature, seems more like what Aristotle might say, although not supportable textually. Cf. Simplicius' concerns discussed in the *Note* on 266a24–26 above.

Perhaps there is a problem with 266a33, here *I.b.i.i*, stating a finite power could achieve the same result as an infinite one in a longer time (cf. Alexander fr. 798 Rashed, and Simplicius 1325.8–24, with Rashed, pp. 628–629), since *Ph.* 7.5, 250a9–25 shows there are absolute lower limits for individual cases to the power that does a given job in any time; thus perhaps the infinite power in

a finite magnitude would only do work that no finite power could. Alexander accordingly corrects Aristotle's argument, first positing that a finite power does a given job, and then explicitly that an infinite power does it in a certain shorter time. Simplicius (1325.25–1326.27) defends Aristotle, effectively saying that if the infinite power achieves a finite result over a finite time, we may assume some large enough finite power will achieve the same result in some sufficiently larger time.¹ If so, the apparent weakness is traceable to the assumption that the infinite power's effect is finite, for defence of which see the final paragraph above of the *Commentary* on the passage (p. 323).

Philoponus (850.26–30) notes that 266b2–4, here *I.b.i.ii.i*, stating that by adding to or subtracting from any finite quantity we eventually pass any limit, addresses directly not only the fact that by adding to the finite power acting in time AB we reach by finite steps the power acting in A, but also that by subtracting from AB we eventually reach the lesser time A. Note that if additions to the power are all equal, the inversely proportional subtractions from the time will not be equal; nevertheless, for instance, for some finite multiple n of the power that acts in AB, $AB/n < A$.

Ch. 10, 266b6–8: (*a.II.i.II*) Argument from Correlated Limitation of Magnitudes & Powers, Introduction and Sub-argument I

Introductory Note

Argument *a.II.i.II* supports, like its predecessor, the conclusion (*a.II.i*) that a limited magnitude cannot have unlimited power (266a24–26, b5–6, b25–26, 267b22–23). For this claim's role in the argument for the prime mover's incorporeality, and on the use of mechanical proportions in these arguments, see above the *Note on Ch. 10, 266a10–b27 & 267b17–26: (A & D) the prime mover's incorporeality* (pp. 307–309), and for a brief review of the sub-arguments within *a.II.i.II* see above the *Note on Ch. 10, 266a24–b27: (A/D.a.II) Argument from a limited magnitude's power* (pp. 319–320).

¹ McKirahan (trans. of Simplicius, p. 110) may be incorrect to translate $\delta\eta$ at 1324.30 (paraphrasing 266a33) as 'then', but even if $\delta\eta$ is here inferential, all Simplicius may mean is that the notation AB for the time a finite power takes follows from the use of A for the time an infinite power takes. Aristotle himself merely includes the point coordinately in the same suppositional protasis with the former.

266b7

Moreover neither can there be a limited power in an unlimited magnitude. (Now indeed there can be a greater power in a smaller magnitude ⟨of one kind of body than of another⟩, although all the more there can be a greater one in a larger magnitude ⟨of the same kind⟩.)

Analysis

The conclusion of Argument *a.II.i.II* is that a limited magnitude cannot have unlimited power, because (*II.a*) a limited magnitude is correlated with a limited power (supplied), since (*II.a.i*) there cannot be a limited power in an unlimited magnitude (266b6–7; cf. b26), supported by Sub-arguments *I–III* following.

In Sub-argument *I* Aristotle first alludes to a potential objection to *II.a.i* above, that (*I.i*) it appears that an unlimited magnitude of a weaker body could have a limited power (supplied), since (*I.i.i*) a larger magnitude of a weaker body can have less power than a smaller magnitude of a stronger body (supplied), because (*I.i.i.i*) a smaller magnitude (of a stronger body) can have greater power (266b7–8) – but, Aristotle responds, (*I.ii*) this appearance (i.e. *I.i*) is false (supplied), because (*I.ii.i*) a yet larger magnitude of the weaker body will have more power than the former magnitude of the weaker body (supplied), since (*I.ii.i.i*) there is greater power in any larger magnitude (of the same kind of body) (266b8).

Commentary

Owing to the structure of objection and response the claims *I.i* and *I.ii* are effectively in contradiction, and only the latter supports *II.a.i*.

Alexander (fr. 801 Rashed; cf. Simplicius 1340.16–21), and Ross (p. 722) following Simplicius, regard all of 266b6–25 (here Argument *a.II.i.II* from correlated limitation of magnitudes and powers, concluding that a limited magnitude cannot have unlimited power) as irrelevant to Aristotle's purpose, but this is not so: that an unlimited magnitude cannot possess a limited power provides additional support to the converse, since it independently supports the likelihood of a general correlation between finitude of magnitudes and of powers; cf. similarly Owen (p. 331 with n. 116), and Zekl (p. xlvi). On Kouremenos (p. 72) see the *Commentary* below on 266b8–20, here Sub-argument *II* (esp. pp. 329–330).

The objection (*I.i*) and Aristotle's response (*I.ii*), and support for each (266b7–8), indicate that Aristotle alludes to such a correlation, suggesting that a stronger relationship, proportionality between quantity of magnitude and of power, is limited to bodies of the same kind. Aquinas (8.1146; but cf. 8.1156) sees the argument's general point but overstates the implication, asserting without qualification that Aristotle "shows that the power in a magnitude must be

proportional to the magnitude in which it resides". Because the idea of a limited power in an unlimited magnitude here is entirely hypothetical, as Graham (1999, p. 171) and Zekl (p. 292 n. 175) note, given that there can be no infinite magnitude according to Aristotle (267b20–22, cf. *Ph.* 3.5 & 8), it has no significance in its own terms, and can only be meant to support the general principle of correlation: see accordingly here *II.a*, supplied.

The reconstruction of Sub-argument *I* as Aristotle's response to an objection accords with Simplicius' explanation (1340.22–1341.17) of 266b7–8, following Alexander, and cf. similarly, Ross (p. 724), Cornford (1934, pp. 412–413 n. *b*), and Graham (1999, pp. 171–172) who elaborates: a small volume of earth may have more power to go down than some large volume of water, but an even larger volume of water will have more power than the latter, "and this is the relevant comparison", apparently correcting Aquinas (8.1157); cf. correctly Apostle (trans. p. 180). As Simplicius notes (*loc. cit.*, and cf. Philoponus 851.2–4), the magnitude and power of the same substance can be each extended in the same proportion *ad infinitum* (although not to the ratio of infinite magnitude to power, given the Greek mathematical principle that there is no ratio between the infinite and anything else; cf. *Cael.* 1.6, 274a7–9).

Ch. 10, 266b8–20: (*a.II.i.II*) Sub-argument *II* from Non-exhaustion of Power

Now let the magnitude to which AB applies be unlimited. Now the magnitude BC has a certain power, which moves the line D (to a given extent) in a certain time, that to which EF applies.² Now if I take double the line BC, it moves D (to the same extent) in half the time EF (for let this be the proportionality), so that it moves it in FG. Then by always taking (a greater multiple of BC) I will never go right through AB, and I will always take a lesser part of the given time. Thus the power (of AB) will be unlimited. For it exceeds any limited power, assuming that the time any limited power takes must be limited (for if this great a power moves it in a certain time, a greater power will do so in a lesser but bounded time, in accordance with the inverse proportionality (of the ratio between power and time)). But every power is unlimited, just like every multitude and magnitude, that exceeds every bounded one.

2 BC is a part of AB, and therefore finite, and thus the time EF is also finite.

Introductory Note

The conclusion above, (*a.II.i*) that a limited magnitude cannot have unlimited power, is supported in Argument *a.II.i.II*, from correlated limitation of magnitudes and powers (266b6–25), by the claim, in the previous passage (*II.a.i*), that neither can an unlimited magnitude have a limited power (266b6–7, b26). This is itself supported by three sub-arguments, here in Sub-argument *II*, from non-exhaustion of power, by two main premisses (*a* and *b*), in which *a* introduces a model of an unlimited magnitude and then *b*, reformulating the conclusion in terms of the model, is supported by the rest of the passage, with two primary premisses (*b.i* and *b.ii*), of which *b.i* then follows from an extensive further sub-argument.

Analysis

Aristotle here concludes that an unlimited magnitude cannot have a limited power (266b6–7, b26), because (*a*) we can let AB be an unlimited magnitude, and BC a limited part of it with the power to move D to some given extent in time EF (266b8–10); and (*b*) in that case the power of AB is unlimited (266b14–15), because (*b.i*) the power of AB is greater than any limited power (266b15), since (*b.i.i*) a greater power (by definition) is that which does an equal amount in a lesser time, such as heating, sweetening, throwing or in general inciting movement (supplied: see 266a26–28 above); and (*b.i.ii*) the power of AB takes less time than any limited power to move D to the same extent (supplied), because (*b.i.ii.i*) the greater the multiple of BC that moves D to the same extent, the smaller the part of the time EF it takes (266b13–14), since (*b.i.ii.i.i*) for instance, twice the magnitude BC will move D to the same extent in FG, half of the time EF (266b10–12), because (*b.i.ii.i.i.i*) we may treat doubling the magnitude and halving the time as the proportionality (266b11–12) – while (*b.i.ii.ii*) AB will take less time to move D to this extent than any multiple of BC (supplied), because (*b.i.ii.ii.i*) no finite multiple of BC exhausts AB (266b12–13); and (*b.i.ii.ii.ii*) each multiple of BC has a limited power (supplied), since (*b.i.ii.ii.ii.i*) BC has a limited power (266b9); and (*b.i.ii.ii.ii.ii*) the quantity of power of a limited body of a given kind is proportional to the magnitude of the body that contains it (supplied) – while (*b.i.ii.ii.iii*) every limited power acts in (no less than) a limited time (266b15–17), because (*b.i.ii.ii.iii.i*) if a certain power (e.g., that of BC) moves D to this extent in a certain time (EF), a greater (limited) power will do so in a lesser but limited time (266b17–18), since (*b.i.ii.ii.iii.i.i*) the time a given movement by a given body takes is inversely proportional to the limited power of what moves it (266b18–19; cf. *Ph.* 7.5, 249b30–250a9) – but (*b.ii*) any power greater than every limited one, just like any such multitude or magnitude, is unlimited (266b19–20; cf. *Ph.* 3.6–7, 206b16–27 & 207b10–13).

Commentary

The textual tradition diverges as to whether 266b15–20, here *b.i.ii.ii.iii* and support, and *b.ii*, continues the argument of b8–15. Ross (pp. 724–725), reading εἰ γὰρ at the end of b15 thinks it does; Simplicius (1341.40–1342.5), reading instead δὲ after πάσης (“But the time any limited power takes must be limited”) introduces at this point a second argument for the power’s unlimitedness. (McKirahan, trans. of Simplicius, p. 177 n. 490, complains, against Ross’s citation of Simplicius, that the latter doesn’t quote a text with the latter reading, but that he had this before him is clear from his interpretation.) Wicksteed (trans., p. 415) agrees with Simplicius, whereas Cornford (1934, p. 414 n. *a*) proposes that Simplicius’ text can also support a unitary reading, and cf. Simplicius (1342.27–33); see below on this view. The *Analysis* here follows Ross’s text, and in a general way his interpretation, but not his formulation of the argument (see esp. p. 725).

Ross identifies the key premiss to be supplied, the implication of 266b8–14, as that an unlimited body AB does its work in less than any determinate time (cf. similarly Cornford, 1934, p. 414 n. *a*, Heath, p. 154, and Wagner, p. 699). But without the conception of an infinitesimal it is hard to see how Aristotle would be willing to formulate this directly; in the *Analysis* here what is supplied instead is *b.i.ii*, that the power of AB will do its work in less time than any limited power, which, given that quantities of power are being compared, allows us immediately to apply the definition of relative quantity of power, here *b.i.i*, from the previous argument (fourteen lines earlier), to support the implication that the power of AB is greater than any limited power (266b15, here *b.i*). In Ross’s account of “the well-knit argument”, followed by Heath (pp. 154–155), this follows from his supplied premiss in conjunction with the result of the second part of the passage, that every limited power acts in a limited time (266b15–17), but b15–17 serves better here as *b.i.ii.ii.iii*, helping support the required implication of the fact that AB is greater than any multiple of a part (266b12–13, here *b.i.ii.ii.i*), which is that AB will take less time to act than any finite multiple of a part of itself (*b.i.ii.ii*).

Ross (p. 724) suggests Aristotle denominates as EF the time in which the part BC moves D because we should assume E represents the time in which AB does so (266b8–10, here *a*), but Kouremenos (pp. 72–73) asserts the latter time is considered finite. Yet contrary to his claim, this argument is not a *reductio as absurdum*. Secondly, because he thinks that Aristotle implies in Argument *a.II.i.I* above (266a26–b5) that the fastest acting body would be infinite and act in an infinitesimal time (equivalent to no time) Kouremenos asserts that Aristotle here generalises from 266b4–6 (the inference from the impossibility of a finite and an infinite power achieving the same result in the same time, to

the result that a finite body cannot have infinite power); thus he understands Aristotle's present argument as that the infinite body AB acts in an infinitesimal time.

But this interpretation is wrong, since Aristotle in neither argument considers the fastest possible movement, but only relative times to complete a given change, and he only conceives of quantities of power relatively, on this basis, such that infinite power is conceived as what acts in a lesser time than any given finite power, not in an infinitesimal time, as such, and not as that which acts fastest absolutely. The same is true of *Cael.* 1.7, 274a14–24, to which Kouremenos here refers. It seems clear from Kouremenos' own references (p. 74 n. 112), *Cael.* 2.4, 287a23–30, *Metaph.* 10.1, 1053a8–10, *Ph.* 4.14, 223b12–20, that Aristotle conceives of the fastest movement as such (the diurnal rotation of the fixed stars) only in terms of the relation between the extent of change and the time taken, not in terms of power.

Thirdly Kouremenos (pp. 75–76) proposes that Aristotle conceives in this argument of the infinite body as air, corresponding with the previous argument, where, Kouremenos thinks, he conceived of the finite body as air owing to Plato's doctrine that the elements cause everlasting movement throughout the cosmos (*Ti.* 57d–58c); thus, Kouremenos argues, the present argument would have a well-conceived role in the chapter. But that could only be so if the present argument showed that an infinite body with infinite power would act in no time, contrary to the text, which shows instead that Aristotle aims to disprove the possibility that this body's power is finite.

As mentioned above, Simplicius and Wicksteed identify two distinct arguments in this passage. It is possible to construe 266b8–15 as a coherent argument, identical with the *Analysis* here to *b.i.ii.ii* (the supplied premiss that AB will act in less time than any multiple of a part of itself), supported only by 266b12–13, here *b.i.ii.ii.i* (stating that no multiple of its parts exhausts AB). But it is difficult to find a distinct, useful second argument in b15–20. Graham (1999, p. 172) criticises Wicksteed's attempt (p. 415, depending on the content of his added n. *b*, not suggested by the text). More promisingly we could take b17–20 (stating the inverse proportionality) as supporting b15–17 (stating that the time any limited power takes must be limited); but then to infer from this that the power of AB exceeds any limited one (b15) we would also need the unstated premiss that AB takes less than any limited time, but that is not obvious without b12–14 (*ex hypothesi* from the preceding argument), that repeatedly increasing the multiple of BC will not exhaust AB but will constantly reduce the fraction of the given time EF (cf. Simplicius 1342.19–25).

This construction faces two significant objections, firstly that the putative second argument merely restates the first in other terms, introducing no inde-

pendent considerations, and secondly, that it only differs significantly by extending the inverse proportion between a power and time to that of an infinite power to an infinitesimal time; but for Aristotle or any Greek mathematician the infinite is not in any proportion to anything (cf. *Cael.* 1.6, 274a7–9). Thus it is preferable to construe b8–20 as one single argument.

Aquinas (8.1158) wrongly describes the argument as a *reductio ad absurdum*, turning on the implication that a greater power moves in less time, on the grounds that by repeatedly doubling BC and halving the time we get to a time less than the finite time AB takes, but without having reached the magnitude of AB; but he is mistaken to think Aristotle's argument appeals to the fact that AB acts in a finite time (although that would indeed follow from his assumption that it has finite power). Aquinas, followed by Apostle (p. 341 n. 11), also unnecessarily assumes that BC is a body of another genus than AB, rather than a part of it. Apostle makes no reference to the textual problem but seems to assume the argument is one; but his explanation, apparently following Aquinas in assuming AB acts in a finite time, is unnecessarily obscure, bearing little relation to the text, and not explaining the inference from the inverse proportionality of time and power.

Contrary to Todd (trans. of Themistius, p. 152 n. 839), Themistius (234.5–7) does apparently refer to part of Argument *a.II.i.II*; following Todd's correction of the text, Themistius would seem to explain 266b8–20, here Sub-argument *II*, saying that just as the hypothetical unlimited magnitude is greater than any multiple of a part of itself, so its power must be unlimited, being greater than any multiple of the power of that part; this supports the general principle of the proportionality of magnitude and power (for a given kind of agent).

Notes

Perhaps 266b11–12, here *b.i.ii.i.i.i*, represents Aristotle's illustration of the principle of inverse proportionality on the diagram he originally used, choosing *exempli gratia* to double the magnitude and so halve the time (thus Cornford, 1934, p. 413 n. c; cf. Rashed, p. 632). But note this corresponding doubling and halving is imagined as to be applied repeatedly to any extent at 266b12–14, here *b.i.ii.i–b.i.ii.ii.i*, apparently contrary to Cornford's understanding: see Heath (p. 514). As above at 266a33–b2 (see Argument *a.II.i.I*, pp. 320–325), Aristotle applies the principles of physical proportionality demonstrated at *Ph.* 7.5, 249b27–250a9.

For the principle (**Premiss *b.i.ii.ii.ii.ii***) supplied here, that the quantity of power of a limited body of a given kind is proportional to the magnitude of the body containing it, cf. Apostle (p. 341 n. 11), contrary to Kouremenos (p. 73 n. 109). Aristotle cannot infer infinite power directly from the assumption of an infinite

magnitude, since in Greek mathematics there is no ratio between anything infinite and anything else (moreover to do so here would be a *petitio principii*). This premiss might nevertheless seem to involve a *petitio principii*, since the conclusion follows directly from it alone, but I only supply it to show how Aristotle draws out the implications of 266b9, here *b.i.ii.ii.i*, that BC has a limited power, once it is multiplied up, and so of b12–13, here *b.i.ii.ii.i*, that no finite multiple of BC exhausts AB.

Ch. 10, 266b20–27: (*a.II.i.II*) Sub-argument (*III*) by Limitation of the Magnitude

266b21 *It is possible to demonstrate this as follows too: for we will take a certain power that is the same in kind as the power in an unlimited magnitude, a power in a limited magnitude, so that it will measure off the limited power in what is unlimited. So from this it is clear that it is not possible for there to be an unlimited power in a limited magnitude, nor a limited power in an unlimited magnitude.*

b25

Analysis and Commentary

Here Aristotle first argues that there cannot be a limited power in an unlimited magnitude (266b26, cf. b6–7), because (*a*) we can let A be the limited power of a magnitude B thought to be unlimited, and C a power of the same kind that is some fraction of A in a limited magnitude D; and (*b*) in that case B must be limited (266b20–23), since (*b.i*) some definite multiple of magnitude D will equal magnitude B (supplied), because (*b.i.i*) some definite multiple of C will equal the power A (266b23–24); and (*b.i.ii*) the quantity of power of a body of a given kind is proportional to the magnitude of the body that contains it (supplied).

Aristotle next states (i) the overall conclusion of the nested series of arguments, (*a.II.i*) that a limited magnitude cannot have unlimited power (266b25–26; cf. a24–26, b5–6, 267b22–23; first reached above by Argument *a.II.i.I* in 266a26–b5), and then (ii) the converse, that equally there cannot be a limited power in an unlimited magnitude (266b26, cf. b6–7; supported immediately above by Sub-arguments *I–III*, 266b6–25). Note that (ii) itself is used in Argument *a.II.i.II*, from correlated limitation of magnitudes and powers, again to infer (i) = *a.II.i*. For further details see above the *Note on Ch. 10, 266a24–b27: (A/D.a.II) Argument from a limited magnitude's power* (pp. 319–320), and cf. *Ch. 10, 266b6–8: (a.II.i.II) Argument from correlated limitation of magnitudes & powers, introduction, and sub-argument I* (pp. 325–327).

Aquinas (8.1159), Ross (p. 725), Heath (p. 155), Graham (1999, p. 172) and Wagner (pp. 699–700) assume that Sub-argument *III* here, only sketched in the text at 266b20–24, would involve a *reductio ad absurdum*, and the absurdity would be that a finite magnitude had the same power as an infinite magnitude; but that seems more like a concession anyone defending the view that an infinite magnitude could have a finite power would be willing to make (thus 266b22–23); I follow Cornford (1934, p. 415 n. c), who assumes the result is not absurdity, but a contradiction of the (logically unnecessary) assumption that the magnitude containing the original power could be infinite. The contradiction results from identifying a finite magnitude with a finite fraction of the power of the first magnitude, but of the same kind, and then multiplying that finite magnitude by the ratio the original power has to that in the finite magnitude, and so demonstrating that the original magnitude must also be finite. Apostle (p. 341 n. 12) suggests the assumption supplied here at *a.i.ii*, but on his analysis (p. 341 n. 13), otherwise corresponding to that here, the implied conclusion is that the initial magnitude has unlimited power, not that the magnitude is limited (as here).

Note on Ch. 10, 266b27–267a20: (B) On Things Thrown

This is the second major part of the chapter; for the chapter's overall structure see the *Introduction* (esp. p. 306). Aristotle here presents (1) a discussion of the problem (266b27–267a2), and then (2) his explanation (267a2–20).

Zekl (p. xlv) regards this topic as “not on the same level” as that of the prime mover’s incorporeality, and merely a “workshop question” in debate with Plato, apparently because he claims (pp. xlviv–xlv, 293 n. 178), misleadingly, that the subject here reverts from the mover to what is moved; rather, this question is about what moves a projectile.

Ch. 10, 266b27–267a2: (B.1) The Problem of Things Thrown

But concerning things that are transported, it is well first to solve a certain difficulty. For if everything moved is moved by something, in the case of all those that do not move themselves, how are some moved continuously, if what incites movement is not in contact with them, such as things that are thrown? But if someone who incites movement at the same time also moves something else, such as the air, which incites movement by being moved, nevertheless it is impossible for that to be moved if what is first neither is in contact nor incites movement; rather everything (must) both

266b27
b30

267a1

be in movement and have stopped when what first incites movement stops doing so, even if it makes what it moves capable of inciting movement, like a stone can.

Analysis

Aristotle argues that it is necessary to solve a problem about things subject to locomotion (266b27–28), explaining that (*a*) the question is how some things not moved by themselves, such as things thrown, are moved continuously if they are not in contact with what moves them, assuming that what is moved is (in every case) moved by something (266b28–30, cf. *Ph.* 8.4, 256a2–3), since (*a.i*) we may assume the thrower at the same time moves something else, such as the air, which by itself being moved incites movement in what is thrown (266b30–32); nevertheless (*a.ii*) in that case it would be impossible for what is thrown to continue being moved when it loses contact with what first incites movement (266b32–33), because (*a.ii.i*) what first incites movement might act like a magnetic stone, making what it moves itself capable of inciting movement (267a2); yet (*a.ii.ii*) everything must then either be in movement or have stopped together, when what first incites movement stops doing so (266b33–267a1) – while (*b*) if things thrown are moved continuously without contact with what moves them, perhaps the first thing moved in the cosmos can remain in movement without a first mover (supplied).

Commentary

As Ross (p. 725), following Simplicius (1344.12–27; cf. Alexander fr. 804 Rashed), notes, *Ph.* 8.4 was meant to establish that what is moved is acted upon by what moves it, but it is unclear what that can be once the projectile has left the thrower's hand, and why it does not immediately fall to the ground. Solmsen (1961, p. 273 n. 11) notes that in *Ph.* 7.2 Aristotle argues any moved mover must be in contact with what it moves. As Waterlow (1982, p. 170 n. 6) observes, the problem is not so easily solved as that of elemental movement, since what is thrown moves unnaturally, so, on Aristotle's principles, must have a contemporary mover to keep it in movement. Apostle (p. 342 n. 14) recognises Aristotle is only concerned with the horizontal or upward movement of something thrown, not the return to earth, since it falls naturally, on the explanation of elemental movement in *Ph.* 8.4.

The relevance of the problem must be that unless projectiles can be explained on the principle that what is moved is contemporaneously acted upon by what moves it, the requirement for the inference from an everlasting movement to an everlasting mover might be undermined (see *b* in the *Analysis* above); cf. Heath (p. 156), following Simplicius, and Lang (1998, pp. 212–213).

Then in the immediately preceding context, since the everlasting movement cannot be caused by a finite magnitude, by putative analogy with things thrown one could infer there is no concurrent mover, rather than a mover without magnitude. By contrast Kouremenos (pp. 42–50) interprets the problem as exclusively concerning the possibility he thinks Aristotle aims to reject, that air is the prime mover, for which see the *Introduction* to the chapter (pp. 304–305).

Notes

Graham (1999, p. 173) mistakenly claims that at 266b28–29, here *a*, the initial statement of the question, Aristotle excludes self-movers from the requirement that everything in movement has a mover: rather, here he identifies the kind of thing in movement to which things thrown belong as those not moving themselves. Graham mistranslates ὅσα κτλ, as does similarly McKirahan (trans. of Simplicius, p. 132) and cf. Aquinas (8.1160): the antecedent is τούτων (suppressed), depending on ἐνία. Things moved are divided into those moved by themselves and those moved by something else, among the latter of which projectiles seem problematic; cf. correctly Wicksteed (trans., p. 417), and Wagner (pp. 267 and 700).

On 266b30–32, here *a.i*, the assumption that the thrower moves the air moving the thing thrown, Aquinas (8.1161) and McKirahan (trans. of Simplicius, p. 177 n. 500) both report the opinion that this is Plato's view, but this is not his theory's defining factor, nor, so stated, adequate to distinguish it from Aristotle's solution; cf. 267a16–19 in Section *B.2* below, with discussion.

As Apostle (p. 342 n. 17) comments, at 267a2, here *a.ii.i*, comparing the mover of something thrown to a stone (λίθος), Aristotle might mean either a stone that, once moved, causes further movement, or (see the *Analysis* here) a naturally magnetic stone, as a first mover causing objects it attracts to become magnetised and so themselves attractive. A magnet, as a paradigm for action at a distance, might here seem irrelevant (or even inconsistent with Aristotle's principles); yet λίθος is in the nominative, and so should perhaps be understood as exemplifying τὸ πρῶτον κινεῖν at a1, taken also as the subject of ποιεῖ in the following clause. Otherwise perhaps the implied subject of ποιεῖ ('makes') should be πάντα (266b33, 'everything'), referring to moved movers. Just previously (b31) air exemplified these, to which Aristotle immediately returns, adding water (267a3–4); it would then be possible that a stone is another example of a natural body as a moved mover, as Apostle suggests. Nevertheless I follow Themistius (234.21–29), Simplicius (1344.15–20), Philoponus (851.8–10), Ross (pp. 725–726)

and Wagner (p. 700), who think Aristotle means by *λίθος* a natural magnet; Ross compares Plato *Timaeus* 80c, a work Aristotle definitely has in mind here (see below, on 267a15–17, pp. 337 & 341), and cf. similarly Wicksteed and Cornford (1934, p. 417 trans. and p. 416 n. a), comparing also Plato *Ion* 533d: all rings depending in series on a magnetic stone are either together themselves magnetic, inciting movement, or not, depending on the presence or absence of the original stone. Thus the magnetic stone signifies not action at a distance but the originating source of active power transferred by contact. Lang (1998, p. 212) is clearly wrong to take the stone as the projectile at 267a2–8 without comment.

Ch. 10, 267a2–20: (B.2) Aristotle's Explanation of Things Thrown

267a3 *Now we must say this, that what first incited movement makes either the
air or the water or something other of this kind, that naturally incites
a5 movement and is moved, able to incite movement. But it does not stop
inciting movement and being moved together; rather, it stops being
moved together with the person inciting movement stopping inciting
movement, but it is still something inciting movement. Because of this,
it actually moves something else adjacent; and in the case of this the
account is the same. But this is coming to a stop when in each case the
power of inciting movement comes to be less in what is adjacent. And it
a10 stops finally when what is prior in the series no longer makes what it acts
on into something that incites movement, but only something in move-
ment. And these, the one inciting movement and the other being moved,
must stop together, along with the whole movement. So this movement
comes to be in those things that are capable of being moved at one time
and being at rest at another, and it is not continuous, although it appears
a15 so. For it is either a movement of things in series or in contact; for what
incites movement is not one, but things adjacent to one another.*

*For this reason this kind of movement, which some people call re-
encycling,³ happens in the air and in water. But it is impossible to solve the
puzzles otherwise, except in the way that has been stated. Re-encycling
causes everything to be moved and incite movement together, so that they
a20 also stop together; but, as it is, it seems to be some one thing in continuous
movement; then what is it moved by? (But it isn't in continuous move-
ment), for it is not moved by the same thing.*

3 ἀντιπερίστασις (*antiperistasis*): see below the Note on Premiss c.i and 267a16–17 (p. 341).

Analysis

Aristotle concludes that the movement of something thrown is not really continuous (267a13–14, cf. a19–20), because (a) underlying movements occur within things capable of both movement and rest (267a12–13); and (b) these are things either in a series or in contact, such as bodies of air or water (267a14, a15–16), because (b.i) what continues inciting movement is not one, but things adjacent to one another (267a14–15, a20), since (b.i.i) the body of the medium initially moved by what first incited movement continues inciting movement in another adjacent body after itself stopping being moved (267a7), because (b.i.i.i) what first incited this movement caused the air or water, or other medium that naturally can incite movement when itself moved, to be able to incite movement (267a2–5); but (b.i.i.ii) the medium does not stop inciting movement and being moved together (267a5), since (b.i.i.i.i) the initial body of the medium stops being moved when the person inciting movement stops inciting movement, but continues inciting movement (267a5–7) – while (b.i.ii) next, this adjacent body stops being moved when the initial body of the medium stops inciting movement, but again continues inciting movement (267a7–8); and (b.i.iii) the whole system of movements begins tailing off once the power of inciting movement acquired by each succeeding body of the medium begins to be less than that of its adjacent predecessor (267a8–9); and (b.i.iv) the movement stops entirely once what is prior in the series no longer causes what it acts upon to incite movement, but only to be moved (267a9–10); and (b.i.v) the body of the medium that last incites movement, and what is last moved, must stop, respectively, inciting movement and being moved together with the whole movement (267a10–12) – moreover (c) it is not possible to solve the problem otherwise than in terms of non-continuous movement (267a17–18), since (c.i) even Platonists who call the movement of projectiles ‘re-encycling’ (ἀντιπερίστασις, *antiperistasis*) fail to explain it (supplied: cf. 267a16–17, and Plato *Timaeus* 80a1–3 with 79b–e), because (c.i.i) in re-encycling everything must stop when the first mover stops inciting movement (267a18–19), since (c.i.i.i) in re-encycling everything must incite movement and be moved at the same time (267a18–19).

Commentary

Simplicius (1345.22–1346.10), followed by Heath (pp. 156–157) misidentifies the magnet’s action (cf. 267a2 in Section *B.1* above, p. 334 with pp. 335–336) as paradigmatic for Aristotle’s solution to the problem, given that what is magnetised by a natural magnet can continue to incite movement by attraction after having itself ceased being moved; but 266b32–267a1 (in Section *B.1*) contradicts this suggestion. Heath thinks the solution is that, on Aristotle’s model,

unlike re-encycling (ἀντιπερίσταςις, discussed below, p. 341), parcels of air pass on not merely movement, but the power to cause movement; but this alone ignores the criticism above (266b32–33, in Section *B.1*), that movement could not continue when contact with the original mover fails.

Aquinas (8.1162) recognises the solution only starts at the present point. Ross (pp. 726–727) indicates the importance of the *Analysis*'s top-level premisses, *a* and *b* in 267a12–16, for the chapter's main concern: that contrary to that of the first moved body, the movement of something thrown is not truly continuous (since the bodies involved each separately start and stop), and involves discrete movements by a necessary plurality of bodies. Contrary to the *Analysis* here both Simplicius (1350.10–1352.18) and Aquinas (8.1163) treat the argument at 267a12–20 as a separate section, although the evaluation of re-encycling (ἀντιπερίσταςις, 267a16–19) as an alternative explanation provides a more natural break (cf. here *c*; the *Analysis* shows a2–12 naturally supports what follows at a12–16).

The key feature of Aristotle's solution to the problem of projectile movement is that the medium (e.g., air) in which something is thrown divides into a series of parcels, each communicating the power to incite movement to its successor, and, after its predecessor has stopped moving it, continuing to incite movement in its successor; this is meant to explain how something thrown can still be moved after the initial agent ceases acting; cf. Graham's illustration (pp. 173–174). Aquinas (8.1162) claims the (putative) fact that something moved can incite further movement at the very point at which it itself stops is empirical evidence for this, but that is unaristotelian, since for Aristotle movement does not occur at a point in time. The initiation of the air's power to incite further movement might be meant either to result first incidentally from the action of the thrower's arm on adjacent air at the point of the missile's release (Graham, loc. cit.: "say, his follow-through"), or *via* the missile's initial action on the surrounding air; 267a2–8, here *b.i.i*–*b.i.ii* and support, suggests the former.

Aristotle also discusses this at *Cael.* 3.2, 301b18–30, saying air is the tool of both natural and unnatural movement, because it is both relatively light and heavy (compared respectively to earth or water, and fire); thus as light, when pushed from below it derives the ability to cause upward movement from its mover's power, and vice versa, *qua* heavy (presumably acting to force down a mass of fire, or speed downward something already heavy). This, he says, also explains unnatural movement when the mover is not in contact (i.e., projectile movement). Accordingly Lang (1998, pp. 213–214) argues that in *Ph.* 8.10 the power of each parcel of air to incite further movement in the projectile consists in the air's own natural upward movement. This cannot be the case, since Aristotle says that the parcel incites movement in the projectile after having

itself ceased movement (267a5–7, here *b.i.i.iii.i*); moreover Lang's proposal does not explain horizontal movement of an arrow or spear any more than the *De caelo* passage does.

Simplicius (1346.29–1348.5; cf. Alexander fr. 805 Rashed), quoting at length, recommends Alexander's explanation (cf. similarly Themistius, 235.7–12), invoking a parallel with natural elemental movement. Each parcel of air is made 'in a way' temporarily self-motive by its predecessor, explaining the mover's continuing contact with moved parcels. Yet (i) this introduces an idea Aristotle has already rejected (unanalysable self-motion: *Ph.* 8.5) and (ii) is contradicted by the statement that a parcel of the medium continues causing movement after it has itself stopped (267a5–7, here *b.i.i* and justification). Simplicius (1348.6–1350.9) recognises both these objections, quoting Alexander's inadequate response to (ii), claiming the parcel continues moving itself after its mover ceases moving it (followed by Apostle, p. 342 n. 20); he argues against (i), the air is a not real self-mover with distinct moving and moved parts, but rather a case like spinning tops and gongs that resound after being hit (yet this merely generalises the problem). Then Simplicius suggests rather lamely that because the intermediate elements air and water have both natural upward and downward movement (cf. the *De caelo* passage), perhaps they also have a natural lateral movement while not in contact with a mover. Apostle's (p. 342 n. 27) comparison of Aristotle's explanation with the law of inertia also rests on the mistaken idea that Aristotle means a parcel of air continues moving itself (rather than an adjacent parcel) after its predecessor ceases moving it.

Kouremenos (pp. 45–47) thinks the problem of continuing movement is explained by the simultaneous displacement of air from ahead of the projectile, and of more air immediately into the place the projectile vacates, so the latter parcel is in contact with the projectile while still in movement, and thus pushes it. That also does not accord with Aristotle's statement that each temporarily movement-initiating parcel of air is not still in movement (267a5–7, here *b.i.i* and justification). Kouremenos explicitly reduces the account to what Aristotle calls ἀντιπερίστας ('re-encycling': see below, p. 341), but Aristotle argues that this alone does not explain projectile movement (267a16–19, here *c* and justification).

We could compare and contrast Aristotle's conception here with a slightly different one whereby parcels of air, each being moved in turn by its predecessor, become, in turn, compressed by the resistance of the air ahead, so that each, having eventually ceased movement, continues exerting pressure temporarily on the parcel ahead and moving it further until the former regains its original volume. By contrast, Aristotle denies volume can be compressed except by expulsion of a foreign body or substantial change (*Ph.* 4.7, 214a32–

b10, cf. 4.8, 215a14–19 on projectiles). Thus he must think parcels of air, after ceasing movement, each continuing ‘exerting pressure’ on their neighbour, yet not owing to compression, and without explanation of how they maintain contact with the neighbour once it is first moved away, or how the neighbour can then be moved without contact (which was the original *explanandum*). Cf. also *Mechanica* Chs. 32–33, 858a13–22, with Heath (p. 158).

Graham (1999, pp. 174–176) rightly complains that Aristotle does not explain how parcels of the medium retain a power to cause movement after ceasing to be moved, suggesting that if the conception were that the medium contains an impulse (i.e., that parcels are made self-motive) then someone could argue, contrary to Aristotle’s intention, that the heavenly sphere’s rotation could continue by impulse alone. Yet Graham’s claim that Aristotle asserts the medium “conserves motion” is anachronistic and inaccurate: according to Aristotle a series of distinct movements are required, which sufficiently distinguishes this case from continuous celestial movement. Zekl (p. 293 n. 181) further objects that Aristotle does not explain why the power of inciting movement of some parcel of air should first be less than its predecessor’s (see 267a8–9, here *b.i.iii*), without which no projectile would ever eventually fall to earth; cf. Philoponus 641.13–642.20, cited and discussed in Sorabji (1988, pp. 228–230, and see generally his ch. 14 with further references). Hussey (1991, pp. 230–236) argues that Aristotle does not aim here to provide a theory, but merely to sketch the pre-requisites for a theory, although he admits the difficulty of understanding how parcels of air might function as unmoved movers.

Notes

In 267a7–8, here *b.i.ii*, stating the effect of the first mover on what it moves is replicated in what the latter in turn moves, Alexander (fr. 806 Rashed) seems wrong to explain “in the case of this” (ἐπὶ τούτου) as referring to the projectile: it must either refer back to the mover that first continues causing movement once no longer itself moved (a5–7: the first parcel of air), or more naturally the next adjacent one (a7, τι ἄλλο ἐχόμενον).

Seeck (p. 167) regards 267a10–12, here *b.i.v*, stating the last mover and moved body together cease causing and undergoing movement, as another later insertion, and an objection to Aristotle’s solution here (as with 267a19–20: see the *Note* below, pp. 341–342). Seeck argues that the present statement, asserting coincidence of the mover’s action with the movement it causes, contradicts the basis of Aristotle’s solution to the projectile problem, his breaking the principle that an intermediate mover’s action must coincide with its own movement (267a7, here *b.i.i*). But there is no contradiction, since a mover’s relation to its

own movement is not formally the same as that to the movement it causes. Aristotle here as elsewhere consistently maintains coincidence in the latter case, which is alone at issue in 267a10–12.

Simplicius (1351.28–29) rejects the **Premiss c.i** (here supplied) that denies re-encycling (ἀντιπερίστασις, *antiperistasis*: mentioned 267a16–17) explains the problem. He reports Alexander as stating that Plato explained projectile movement by this phenomenon (cf. Alexander fr. 810 Rashed). *Antiperistasis* is a technical term not found in *Timaeus*, where breathing is explained as alternating reciprocal flows caused by alternating differences in internal and external pressure (79b–e; cf. Ar. *Resp.* 472b13–20); *Timaeus* then claims this principle also explains other things including thrown objects, but without giving details (80a1–3). The idea (Simplicius 1350.31–36, explains) is apparently that air pushed aside by the thrown object presses on the air behind all the way back to the air behind the missile, and this pressure pushes the object further forward. Aristotle also contrasts his own solution with this at *Ph.* 4.8, 215a14–17, claiming these two explanations do not require a void. Lang’s assertion (1998, p. 212), that the name *antiperistasis* merely refers to the phenomenon that Aristotle here explains, is thus slightly misleading.

Aristotle apparently rejects explanation by *antiperistasis* because it does not explain the appearance of continuous movement (267a19–20, here taken to allude to Aristotle’s conclusion). Presumably, on the model of the explanation of breathing, he sees that when the missile moves forward slightly, and all the air in the chain to the back is immediately displaced to take up the space left behind it, there would no longer be any pressure, and both missile and air ought to come to rest immediately. Aristotle has no conception of momentum or impulse to explain continuing forward movement, and thus a further build up of pressure, once the original pressure is relieved, but as discussed denies there is real continuity, accounting for its appearance by the transfer of the power to incite movement through the air itself. Alexander (fr. 811 Rashed) and Simplicius (1351.12–17) seem right to say Aristotle accepts that *antiperistasis* occurs in such cases, but denies only that it explains the movement.

Seeck (pp. 167–168) argues that 267a19–20, alluding back to the conclusion that the movement of thrown things is not continuous, is a further later addition to the section 266b27–267b17 (itself according to Seeck already a later addition to the original chapter: see *Introduction* to Ch. 10, esp. p. 307). Seeck interprets 267a19–20 as objecting to Aristotle’s solution to the projectile problem: he understands the first sentence there as “but as it is one thing is clearly moving continuously” (κινούμενον as supplementary, not in the subject), and noting

Aristotle's doctrine that one mover causes the continuous movement of one body, he regards the last sentence ("for it is not moved by the same thing") as hypothetical, rejecting the explanation that the medium contains a series of distinct unmoved movers. He also suggests that perhaps the preceding sentence a18–19, here *c.i.i*, is another insertion, since it is unclear what attitude is taken to *antiperistasis* here (see the immediately previous *Note* on *c.i*, supplied, and 267a16–17). Nevertheless it is clear from the statements that continuity of projectile movement is a mere appearance (267a13–15; cf. the conclusion), and that the movers are plural (cf. *b* and *b.i*), that a19–20 merely repeats the key features of Aristotle's own solution.

Note on Ch. 10, 267a21–b17: (C) Location (& Identity) of the First Moved Body

Overall here Aristotle argues forwards (contrary to his usual practice), from previously established results, which he first confirms, in particular presenting a reprise argument (*C.1.I*) for an unmoved first mover (267a21–b3), continuing to its implications. (Note that Argument *C.1.II* appears subsequently at 267b9–17.) Thus in Section *C.2* (267b3–6), following *C.1.I*, he infers to the first movement's uniformity, then uses this result in another brief sub-argument establishing the body first moved must be at one of the geometrical principles of the spherical cosmos, the centre or equator (267b6–7); the latter conclusion is then to be conjoined with the conclusion of another sub-argument, that what incites the first movement acts on the equator (267b7–9).

Aristotle does not spell out explicitly the significant implication of the latter point here; in his time this was controversial and so obvious, that the body directly moved by the first mover is not the whole cosmos, as Plato (for whom the mover is a world soul) teaches, most explicitly in the *Timaeus*, *Phaedrus* and *Laws* (see refs. above, p. 304), but just the sphere of the fixed stars at the outer rim of the cosmos. Thereafter Aristotle concludes this topic, as he sometimes does elsewhere (e.g. at the end of *EN* 6 and *Metaph.* 12), by solving a problem presented from an opponent's viewpoint, here restating the view rejected in Ch. 6, that, rather than one unmoved first mover, a series of moved movers could cause continuous movement. In response, parallel to the reprise argument for the everlasting unmoved prime mover in Section *C.1.I* above (267a21–b3), Aristotle provides in *C.1.II* a separate argument for the same conclusion by exclusion of a first mover that is moved (267b9–17).

Two main questions about this passage concern its unity and its meaning. Contrary to the interpretation above, it could be construed as making three

independent points, as Simplicius (1352.19–1357.29) does, identifying these as (i) that the first mover is unmoved and the first movement most uniform (267a21–b6), (ii) that the first mover is located at the first sphere’s circumference (b6–9), and (iii) that only an unmoved mover can incite continuous movement (b9–17). But these passages are better understood as connected parts of a single argument, and the *Analysis* here follows Ross (p. 728), treating a21–b3, here Section C.1.I, with 267b3–6 in C.2, as support for the argument concerning a location at the celestial circumference (b6–9, also in Section C.2), since it is otherwise difficult to explain the concluding remark’s purpose at b3–6 on the first movement’s uniformity (see the *Note* on 256b3–6 below, p. 348). Simplicius (1352.31–32, 1353.20–34) apparently regards this as a corollary demonstrating the world’s everlastingness (but that is not the conclusion drawn), and Aquinas (8.1166–1167) as demonstrating that one mover causes everlasting movement, because an unmoved mover causes regular movement; but the direction of implications the connecting particles specify in 267b2–6 is the opposite: see rather the *Analysis* below. This also follows Ross (p. 728), treating the appended solution to the problem whether anything moved can itself cause continuous movement (b9–17) as further support for the doctrine that the prime mover is unmoved (see Section C.1.II, presented where it comes in the text, pp. 350–353). As a result, 267a6–9, in Section C.2 can be seen to contain the main result of Part C. For reasons to reject the traditional view that these lines concern the location of the prime mover, not the moved body, see the *Commentary* and *Notes* below (pp. 346–349).

Ch. 10, 267a21–b3: (C.1.I) Reprise Argument for an Unmoved First Mover

Since there must be continuous movement among the things there are, and this movement is one, and the one movement must be that of some magnitude (for what lacks magnitude is not moved), and the movement of one magnitude and caused by one thing (for otherwise it will not be continuous, but (in each instance) a different movement adjacent to and distinct from another), well then, what incites movement, if it is one, either incites movement while itself in movement, or being unmoved. Now if it incites movement while in movement, it will have to accompany what it moves and itself change, and together with what it moves it will be moved by something; consequently (this causal chain) will stop (at some point), that is to say, it will come to movement caused by something unmoved. For this need not change with what it moves, but it will

267a21
a25
267b1

always be able to incite movement (since inciting movement like this is effortless), ...

Analysis

This argument supports the conclusion that the first movement has one everlastingly unmoved mover (cf. 267b4–5), since (a) there must be an (everlasting) movement of one magnitude, caused by one mover (267a22–23), because (a.i) there must be one everlasting movement (supplied), since (a.i.i) there must be a continuous movement among the things there are (267a21; proven *Ph.* 8.1–2); and (a.i.ii) a continuous movement is one movement (267a21–22, a23–24; cf. *Ph.* 8.6, 259a13–20, 259b32–260a5; *Ph.* 5.4, 228a20–22) – while (a.ii) a movement must be that of a magnitude (267a22), because (a.ii.i) what lacks magnitude is not moved (267a22–23) – and (a.iii) unless a movement is of one magnitude caused by one mover it is not (one) but a series of distinct movements (267a23–24) – but (b) the single mover of an everlasting movement is either moved or unmoved (267a24–25); while (c) if the mover is moved, it is in a causal series of moved movers (supplied), since (c.i) if the single mover is moved, it will have to accompany what it moves and itself change (267a25–26); and (c.ii) if the mover is itself changed, it will have to be moved by something (else) (267a26–b1) – but (d) a causal series of moved movers and movements must originate from a first movement caused by an unmoved mover (267b1–2; cf. *Ph.* 8.5), since (d.i) there cannot be an infinitely ascending series of moved movers (267b1); and (d.ii) there is no need for an unmoved mover to change along with what it moves (267b2), because (d.ii.i) (unlike a moved mover) an unmoved mover will be everlastingly able to incite movement (without being itself externally moved) (267b2–3), since (d.ii.i.i) inciting movement is effortless for an unmoved mover (267b3).

Commentary

The conclusion here, that there is one everlastingly unmoved mover of the first movement is not explicitly stated until 267b4–5, where it is used as a premiss in the argument of Section C.2, for which see below (pp. 344–345), but is already clearly implied by 267b1–3, here *d* and support.

Ross (p. 728) regards the whole of 267a24–b5 as restating the proof that a first mover is unmoved at *Ph.* 8.5, 257a33–258b9, but the parallel is not exact, and on the analysis of Ch. 5 (see the *Commentary* above, pp. 132–133 with 133–155) that passage demonstrates only that even in self-movers there is an essentially unmoved mover and an essentially moved part, while there is no reference to self-movers in the present context. Graham (1999, p. 176) and Waterlow (1982, p. 228 n. 13) more helpfully compare *Ph.* 8.6, 259a13–20, which, Waterlow

argues, this elaborates. Aquinas (8.1164) and Zekl (p. xviv, cf. p. 293 ns. 184 and 186) state that this proof of the unity of the prime mover is the chapter's main point (Aquinas contrasting the multiplicity of movers required to explain projectile movement); this view misrepresents its aim in theological terms (see the chapter's *Introduction*, pp. 304–307); nevertheless the prime mover does now function as a fundamental explanatory principle.

Notes

At 267a24, here *a.iii*, the text gives 'continuous' (συνεχής), not 'one', but 'one' is required logically, and follows directly from 'continuous'; cf. a21–22, here *a.i.ii*.

With 267a25–26, here *c.i*, Ross (p. 717) compares *Ph.* 8.5, 256b17–18, indicating the point is that a moved mover's causal activity depends upon its own movement (at least in locomotion, which Aristotle here considers), since it must maintain contact with what it moves.

Ch. 10, 267b3–9: (C.2) Implications for the First Moved Body

... and this movement is alone or most of all uniform, for what incites it undergoes no change. And what is moved must undergo no change in relation to that, so that its movement is regular. Now it⁴ must be either in the middle or on the circle, for these are the principles. But the parts nearest what incites movement are moved fastest, and the movement of the circle is like that. Thus what incites movement <acts> there. 267b5

Analysis

The implied conclusion is that the body undergoing the first movement is the sphere of the fixed stars at the outer rim of the cosmos, not the whole cosmos (supplied: cf. Plato, refs. p. 304), since (*a*) what is first moved must be either at the centre or on the circle of the spherical body of the cosmos (267b6–7), because (*a.i*) these are the geometrical principles of a sphere (267b7); while (*a.ii*) the geometrical principles of a rotating sphere do not change in relation to what moves it (supplied); and (*a.iii*) what is first moved must not change in relation to what moves it (267b5–6), since (*a.iii.i*) this is necessary to achieve the result that the first movement is uniform (267b6); and (*a.iii.ii*) the first move-

4 I.e., what is first moved: see the previous sentence, the *Commentary* below (esp. pp. 346–347), and the *Note* on 267b6–7 (p. 349).

ment is uniquely, or most particularly, uniform (267b3–4), because (*a.iii.ii.i*) what incites the first movement is subject to no change at all (267b4–5) – and (*b*) what incites the first movement acts on the circle of the spherical body of the cosmos (267b9), because (*b.i*) the part of the cosmos nearest to what incites the first movement is the circle (supplied), since (*b.i.i*) the parts of a body nearest to what moves it are moved most quickly (267b7–8); and (*b.i.ii*) the part of a rotating sphere moved most quickly is the circle (267b8–9) – while (*b.ii*) what incites a movement acts on what is nearest to it (supplied).

Commentary

For the structure and aim of this part of the chapter compare the *Note on Ch. 10, 267a21–b17*: (*C*) *the location (and identity) of the first moved body*, above (pp. 342–343). On the traditional view these lines concern the prime mover's location (thus Alexander fr. 819 Rashed; Simplicius 1353.36–1355.38; Aquinas, 8.1168; Ross, pp. 727–728; Wagner, pp. 269 and 701; Graham, 1999, pp. 180–181). The *Analysis* here follows Lang (1992, Ch. 4 = Lang, 1981) rejecting this interpretation; cf. similarly Ibn Bājja (229.7–230.9, cited by Lettinck, p. 631). Its difficulties are well expressed by Graham (*loc. cit.*), primarily that attributing location on the sphere to the prime mover is inconsistent with its lack of magnitude demonstrated in this very chapter. For detailed discussion of scholarly treatments, including Judson's response (1994) to Lang, and a justification of the present interpretation, see Blyth (2015, Ahead of Print pp. 25–29), and below, with the *Notes* following.

A debate in antiquity, heavily influenced by the assumption that 267a6–9 concerns the prime mover's location, not the first moved body's, occurred over the question whether Aristotle means by 'the circle' the celestial equator alone or the whole circumference of the outer sphere. According to Alexander, Eudemos (fr. 122a Wehrli, ap. Simplicius 1354.9–10, cf. 1355.32–33) said peculiarly that Aristotle meant "the great circle *through* the poles (*διὰ τῶν πόλων*)", as this moves fastest: see 267b8–9, here *b.i.ii*. McKirahan (trans. of Simplicius, p. 143) thinks Eudemos meant the equator, perhaps supported by Simplicius, quoting from his own reading of Eudemos that "on a sphere the place *about* the poles (*περὶ τῶν πόλων*) moves most rapidly" (fr. 122b, ap. Simplicius 1355.34–36). Whatever this means, Eudemos clearly had no privileged information about Aristotle's conception, as the question he reportedly raised, about the relation what is moved has to the mover, shows (Eudemos fr. 123a, ap. Simplicius 1355.28–30).

Contrary to Eudemos' apparent meaning, Alexander argued that, since the prime mover (whose location he assumed was the topic) cannot be moved,

Aristotle must refer to the whole circumference, since as a whole that is not in motion (Alexander frs. 820–821 Rashed; Simplicius 1354.12–25, 1355.18–28).⁵ Alexander's doctrine reported elsewhere by Simplicius (1260.22–35, 1261.33–1262.1) is that the cosmos as a whole is the place of the prime mover (see above the *Note* on Ch. 6, 259b29–31, pp. 189–191), which differs incidentally from his interpretation here, locating it only at the circumference, but would equally preserve it from being in motion. Nevertheless Alexander's reasoning must be rejected because it implies the prime mover would have the same magnitude as the circumference, albeit incidentally (see further Blyth, 2015, *Ahead of Print* pp. 25–27). Ross (pp. 454, 727–728; and cf. Wicksteed, trans. pp. 421, 423 and Apostle, p. 344 n. 38) assumes without comment that Aristotle means the circumference. Graham (1999, pp. 177–178) first refers to the circumference, then argues for the equator, and finally seems to declare himself agnostic.

Aristotle's statements that the circle and centre are the principles (*ἀρχαί*, *archai*) of the sphere (267b7, here *a.i*), and that the circle is where movement is fastest (referring to linear, not angular velocity: 267b8–9, here *b.i.ii*), might suggest he is thinking of the celestial equator. But perhaps even then he refers to it just as the defining principle of, and so as representing, the circumference as a whole, opposed to both the interior generally, and the centre in particular, of the sphere conceived as a geometrical solid. In that case no precise distinction should be drawn between equator and circumference. Alternatively, 'centre' might refer to the pole, conceived as an axis running vertically through the sphere, by whose means it might be turned; then 'circle' might refer to the circumference conceived as the surface incorporating all the parallel two-dimensional circumferences of differing radii corresponding to any points identified on the pole (cf. Cornford, 1934, pp. 422–423 n. *a*; also Apostle, p. 344 n. 40).

The language (and in the latter case, also the conception) has some similarity with that of Plato *Republic* 10.616c–617d; Socrates' description here may well have provoked Aristotle's question, since at 616c he apparently attributes the cosmos's rotation to the pole of "Necessity's spindle"; he also describes the three Fates occasionally touching and helping move the individual concentric circles constituting the spindle globe (Klōthō, who sings of what is now, in tune with

5 Perhaps, *contra* McKirahan (trans. of Simplicius, p. 143), Diels's punctuation is faulty at 1354.14–15, and this means, 'And saying that if it (the prime mover) is not outside this (the circumference), it is at the poles, he (Alexander) raised the further problem that these are both two in number and motionless, but Aristotle and Eudemus say what is nearest to the mover is moved fastest.' This makes the two problems into a dilemma; cf. alternatively Rashed (p. 642).

the music of the spheres, moving the outermost, 617c). At 616de “showing their edges from above as circles” is ambiguous between each equator’s silhouette and each sphere’s external surface as a whole, although ‘edge’/‘lip’ (χεῖλος) perhaps suits the former better; Socrates then describes each globe as having a “circle (consisting?) of its edge”, whose breadths are, in descending order, those of the outer stars, Mercury, Mars, moon, sun, Venus, Jupiter and Saturn; this differs from order of radial distance, and if only it were clearer what breadth signifies (variations in celestial altitude?) this passage might help determine the astronomical sense of ‘circle’ here in Aristotle (perhaps the band of the zodiac between the tropics?).

Notes

On 267b3–6, supporting the key Premiss *a.iii* here, that what is first moved must not change in relation to what moves it, Ross (pp. 727–728) identifies two conditions to be met for the first movement to be uniform: that its mover is completely unmoved, and that the relationship of mover to what is moved does not change. Yet the overall conclusion of the argument to 267b6 (where the deduction of the location of what is first moved begins) is not that the first movement is uniform. This is expressed at b6, here *a.iii.i*, in a final, not a consecutive, clause, indicating that Aristotle refers to it as a result from which its necessary condition is deduced, that what is moved suffers no change in relation to its mover (b5–6, here *a.iii*). This direction of argument is confirmed by the (otherwise otiose) independent assertion of the first movement’s uniformity (b3–4, here *a.iii.ii*), inferred from the motionlessness of the first mover (b4–5), implying the necessary condition is satisfied. This procedure is valid, assuming the two conditions are not independent of one another, such that the unmoved mover’s motionlessness is a sufficient condition for what it moves necessarily not changing in relation to it. Aristotle takes a circular route to this conclusion in order to emphasize the interconnectedness of these three fundamental features of his theory.

With 267b5–6, here *a.iii*, stating what is first moved must not be subject to change in relation to what moves it, cf. *Ph.* 8.6, 260a1–11; also *Metaph.* 12.6, 1072a7–18, *GC* 2.10, 336a23–b15, and *Cael.* esp. 2.6. As Wicksteed (p. 420 n. b) notes, the contrast implied at 267b3–4, here *a.iii.ii*, is between the rotation of the primary sphere, that of the fixed stars, which Aristotle thought was absolutely regular, and those of the other dependent spheres, including that of the sun rotating on an axis at the angle of the ecliptic, so that the orientation of the latter sphere in relation to the former and the rest of the cosmos, and by implication to the prime mover, varies over the course of the year.

The interpretation of 267b6–7, here *a*, stating *what is first moved* must be either at the centre or on the circle of the spherical body of the cosmos, follows Lang (1992, Ch. 4, esp. pp. 91–92; cf. Lang, 1981) in supplying τὸ κινούμενον (“what is [first] moved”), rather than (as many do) τὸ πρῶτον κινούν (“what first incited movement”) as the subject of εἶναι (‘be’) at 267b6–7: the former is the explicit subject (of ἔχειν) in the immediately preceding sentence (b5–6). Ross (p. 728) defends his reading δῆ (‘now’), not δέ (‘and’) at 267b6, claiming this sentence represents an inference from what precedes, and explaining “for these are the principles” (b7, here *a.i*), as providing a loose secondary reason, but here I take the latter as another premiss in a single argument, thus supplying *a.ii* and accepting Ross’s δῆ with some MSS.

At 267b7, here *a.i*, asserting the centre and circle are the principles of a sphere, Ross (pp. 727–728) suggests Aristotle appeals to the method (known to be employed at the Academy from reports of Speusippus) of producing geometrical entities by imaginary or diagrammatic movements of others: thus a sphere is produced by expansion of the point at the centre, or by contraction from the circumference (as he says). But these might also just be the principles in terms of which a sphere is defined (its boundaries, the limits of inward- and outwardness). As Ross notes, the centre was previously identified as a principle at *Ph.* 8.9, 265b2–4. Apostle (p. 344 n. 39) suggests the centre is a principle of definition, and the surface a principle in the sense of the form of the sphere. Lang (1998, p. 193 with n. 78) implies that she understands Aristotle not to mean the centre and circumference are geometrical principles, but rather physical principles, as the natural goals of terrestrial elemental movement (up and down); but that seems less relevant to rotation.

In 267b9, here *b*, I follow Lang (1992, p. 92 with ns. 23 and 24), supplying κινεῖ (‘moves’) as the verb (see further above the *Commentary* on the present passage esp. p. 346, and the *Note* on 267b6–7, directly above). Only on the rejected assumption that the subject to be supplied at 267b6–7 is τὸ πρῶτον κινούν (“the first mover”) would it follow from the use of εἶναι (‘be’) there that ἐστίν (‘is’) should be supplied at b9. On the question (which Lang does not answer) how the sphere’s circumference can be nearest to the prime mover (cf. b7–8, here *b.i.i*) if the latter has no physical location, see *Cael.* 1.9, 279a16–23, locating the incorporeal unchanging gods beyond the cosmos (ἔξω ... τοῦ οὐρανοῦ), but not in place (οὐτ’ ἐν τόπῳ), and see further Blyth (2015, Ahead of Print p. 28).

Ch. 10, 267b9–17: (C.1.II) Argument Excluding a First Mover that is Moved

This is a second, separate, argument for the conclusion that there is one everlastingly unmoved mover of the first moved body (stated above, 267b5–6); cf. Argument C.1.I at 267a21–b3 (pp. 343–345), and on the order of the text the *Note on Ch. 10, 267a21–b17: (C) location (& identity) of the first moved body* (pp. 342–343).

267b10 *But there is a difficulty whether something moved can incite movement continuously, and not, like what pushes again and again, cause it continuously by serial means. For either that thing itself must always push or pull or both, or one thing taking over from another must, as was previously stated in the case of things thrown, if the air is divisible and the various parts, which are themselves moved, each incite movement. But in either case the movement cannot be one, but is one adjacent to another. Thus the only continuous movement is that which what is unmoved incites; for being always in a similar condition it will also be in a similar and continuous relationship to what is moved.*

b15

Analysis

Here Aristotle concludes that the only continuous movement is that incited by what is motionless (276b16), since (a) being always in a similar condition, this will always maintain a continuously similar relationship to what it moves (267b16–17; cf. 267b5–6); whereas (b) something itself moved cannot incite movement continuously, but only apparently so by serial means, like what repeatedly pushes (267b9–11), because (b.i) either it must always push or pull or both, or there is one thing taking over from another, as in the explanation of things thrown (267b11–13), since (b.i.i) in that case the air is divisible and the various parts, which are themselves moved, each incite movement (267b13–15; cf. 267a2–20).

Commentary

Simplicius (1356.3–7), followed by Ross (p. 728) recognises that this argument confirms the earlier one (267a21–b3, here C.1.I), that the prime mover must be unmoved, eliminating the opposite possibility, that what is moved can be responsible for continuous movement, since moved movers must be corporeal, and so move by serial physical means, not producing continuous movement. Zekl (p. 293 n. 187) plausibly suggests the argument might derive originally from an answer to a listener's question (cf. Alexander fr. 822 Rashed). The two

kinds of moved mover (267b9–15, here *b* and *b.i*) with which Aristotle contrasts an unmoved mover are probably respectively animals (as self-movers) and an element such as the air (thus Kouremenos, pp. 38–39), as the only kinds of moved mover on Aristotle's view with a putatively alternative origin of movement, rather than being links in a chain of movements traceable directly back to the everlasting first mover.

Apostle (p. 344 n. 42) suggests Aristotle thinks of the celestial spheres or the bodies they carry, yet as Alexander argued (ap. Simplicius 1356.33–1357.13; cf. fr. 823 Rashed), although another sphere carrying a planet is carried continuously by the outer sphere (albeit also moved with its own separate movement), there is no counterexample to the principle that only an unmoved mover causes continuous movement, since the first sphere's unmoved mover causes the movement that sphere communicates to all dependent spheres (cf. *Ph.* 8.5, 256a4–13).

The paradigm of continuity involved seems, as usual in Bk 8, to be everlasting continuity, since that requires a continuous unchanged relationship of mover and moved (267b16–17, here *a*). Thus the argument perhaps aims to exclude the possibility of an everlasting cosmos depending on a series of temporary first causes, each in turn producing others before perishing, just like the generations of mortal animals (cf. *Ph.* 8.6, 258b16–259a3, which differs principally in treating each animal as containing an individual unmoved mover), or generated quantities of the elements, such as the air responsible for projectile movement (267b11–15, here *b.i*), and cf. Kouremenos (pp. 38–39), although he seems wrong to interpret the latter as the exclusive alternative to an unmoved prime mover. Alternatively, perhaps Aristotle has in mind Plato's doctrine that a self-moving cosmic soul is the first mover.

Aquinas (8.1171) notes that here everlasting continuity of movement is explained by the motionlessness of the mover (267b16, the conclusion); Aquinas suggests this is because rotation is infinitely repeatable, whereas in the argument that the prime mover lacks limited magnitude (266a24–26, b5–6, b25–26, 267b22–25), in Parts *A* and *D* of the chapter, by contrast, everlasting movement is explained by the first mover's infinite power, because the movement is unlimited, Aquinas suggests. The distinction he makes to explain the apparent inconsistency is scholastic hyperprecision; presumably Aristotle could argue that the immaterial actuality of the prime mover is responsible both for its motionlessness and the effortless mode of causation, which sustains its infinite power, but undoubtedly in his view that is a theological matter, not part of physics.

Here Graham (1999, pp. 178–180) raises the question, debated in antiquity, whether the prime mover is an efficient as well as a final cause (cf. *Metaph.* 12.7,

1072a26–b4), noting that despite defences of this view from Alexander and Simplicius (1361.11–1363.24) to Judson (1994, pp. 164–167), Aristotle never explicitly says so. We must distinguish the question whether the prime mover is an efficient cause of movement from that whether it is a creator, such as the Demiurge in Plato's *Timaeus*, to which Simplicius apparently wishes mistakenly to assimilate it. It is relevant to the former question that the definitive expression for an 'efficient' cause: "that from which the source of movement (comes to be)" (ὅθεν ἡ ἀρχὴ τῆς κινήσεως, frequent in *Metaph.* Bks 1–3, e.g. 983a36) is replaced systematically in *Metaph.* Bks 8–12 with the term used in *Ph.* 8, "what incites movement" (τὸ κινεῖν, *to kinoun*). *Metaph.* 7 begins with the former term, e.g., 1032b22, but in the final chapter, 1041a30, switches to κινεῖν, while the *Physics* uses the former in Bk 2, but thereafter always τὸ κινεῖν. This suggests strongly that these expressions must refer to the same kind of cause, the former describing its mode of operation, the latter its effect. Thus as a mover (κινεῖν), constituting a source of movement for what it moves, the prime mover is by definition an efficient cause. As an unmoved mover, it doesn't move by communicating its own movement, but only, as *Metaph.* 12.7 says, as a final cause. Note that all paradigmatic moving causes instantiate final causation: the father models the actuality of the form that is the final cause of the offspring, and the everlastingness of the sun's movement is an object of imitation by terrestrial species (*de An.* 2.4, 415a27–b8; cf. *Metaph.* 9.8, 1050b28–30; *GA* 4.10, 777b17–178a9; *GC* 2.10, 336b10–15). Thus the question whether the prime mover is an efficient or final cause is confused, and once clarified reduces to the question of whether it moves while itself in movement or as unmoved, the answer of course being the latter.

Notes

On 267b9–11, here *b*, claiming a moved mover only acts continuously by serial means, Ross (p. 728) notes the 'continuity' of serial movements is not properly continuity at all, since the definition of what is serial, that it lacks anything of the same kind in between (*Ph.* 5.3, 226b34–227a1, 6.1, 231a23), is inconsistent with the infinite divisibility of what is continuous (*Ph.* 6.1, 231a24); but cf. the looser sense of continuity at *Ph.* 5.3, 227a15–17.

The question remains why, using Simplicius' example, someone rotating a millstone with his hands, both pushing and pulling, does not produce continuous movement. Philoponus (851.16–18) suggests serial movements will not be continuously at the same speed; Graham (1999, pp. 178–180) refers to mechanical motors, where there is a conversion of serial movements by a piston to rotation (by means of a flywheel), but suggests this case is not a true counterexample to Aristotle's denial that pushing or pulling can produce continuous

movement, although only in respect of the overall movement of the motor, which leaves the question of the continuity of the flywheel's rotation analogous to the case of a millstone. Simplicius (1356.15–20; cf. Aquinas 8.1170) gives the reason that each push or pull must be finite, and so have a start and finish, because each push or pull requires effort. This implicitly contrasts it with the effortlessness of an unmoved mover's causality previously mentioned (267b3) in Section C.2, and the explanation is very plausible. Presumably then, if pullings by several agents overlapped, so the net result was (apparent) continuity of movement in one path, Aristotle would have to argue that because in principle each mover produces one movement in one body, this body must undergo many overlapping distinct finite movements, and, as with something thrown, the continuity of movement is merely apparent. Then for Aristotle a movement's identity would not be indexed only to its course, but its individuating cause (cf. 267a21–23, and Ch. 6, 259a18–19; but contrast *Ph.* 5.4, 227b21–29; 7.1, 242a66–68; 8.8, 262a1–4, with no mention of the cause). This explanation is confirmed by his account of movement in *Ph.* 3.3, where he establishes that any movement is the co-incident actuality of both mover and moved as such.

With the first option in 267b11–13, here *b.i.*, that a moved mover might pull, push or both, Cornford (1934, p. 423 n. *b*) compares *Ph.* 7.2, 243b15–244a4, where all ways a moved mover causes locomotion are reduced to pushing and pulling. Kouremenos (p. 39 n. 48) compares *MA* 3, 699a27–b11, which rejects the possibility of an Atlas-like heavenly mover.

At 267b13–15, here *b.i.i* summarising the doctrine of Section B.2 (267a2–20), explaining projectile movement, Aristotle does not mean that each parcel of air causes movement only while itself moved, just that it is not completely unmoved: cf. 267a5–8.

Ch. 10, 267b17–26: (D) The Prime Mover's Incorporeality, Conclusion

For the relation between Parts D and A of Ch. 10, see (i) the *Note on Ch. 10, 266a10–b27 & 267b17–26: (A & D) the prime mover's incorporeality* (pp. 307–309), (ii) the *Introductory Note on Ch. 10, 266a10–24: (A/D.a.I) Argument from a limited magnitude's effect* (pp. 309–310), (iii) the *Note on Ch. 10, 266a24–b27: (A/D.a.II) Argument from a limited magnitude's power* (pp. 319–320), and also, on the significance of the topic here, see (iv) the *Introduction* to the chapter (esp. pp. 304–306). In the *Commentary* below the reference system for premisses

follows these places and the analysis of the argument is restated in the interests of clarity.

267b18 *Now that these things have been determined, it is obvious that it is impos-*
 sible that what first incites movement and is unmoved should have any
 b20 *magnitude. For if it has magnitude, it must either be limited or unlim-*
 ited. Now it has been demonstrated previously in the works on nature
 that there cannot be an unlimited magnitude; and it has been demon-
 strated now that what is limited cannot have an unlimited power, and that
 b25 *something cannot be moved by what is limited for an unlimited time. But*
 indeed what first incites movement incites an everlasting movement, that
 is to say, for unlimited time. Well then, it is obvious that it is indivisible and
 without parts and something with no magnitude.

Analysis

Here Aristotle argues that what incites the first movement is indivisible and without parts or magnitude (267b18–19, b25–27; cf. 266a10–11), because (a) it cannot have a limited magnitude, supported by Argument *I*, from a limited magnitude's effect, because (*a.I.i*) a limited magnitude cannot incite movement for an unlimited time (267b23–24; cf. 266a12–13, and a22–24); but (*a.I.ii*), what first incites movement incites movement for an unlimited time (267b24–25) – and by Argument *II*, from the impossibility of an unlimited power in a limited magnitude, because (*a.II.i*) a limited magnitude cannot have unlimited power (267b22–23; cf. 266a24–26, b5–6 and, b25–26); but (*a.II.ii*) what incites the first movement must have unlimited power (supplied), because (*a.II.ii.i*) it causes movement for an unlimited time (267b24–25, = *a.I.ii* above) – but (b) there is no unlimited magnitude (267b20–22; proven *Ph.* 3.5 and 3.8); while (c) any magnitude has to be either limited or unlimited (267b19–20).

Commentary

Premiss *a.I.i*, that a limited magnitude cannot incite movement for an unlimited time (267b23–24; cf. 266a12–13, and a22–24), is the conclusion of the section of Argument *I* in Part *A* above (266a10–24); and Premiss *a.II.i*, that a limited magnitude cannot have unlimited power (267b22–23; cf. 266a24–26, b5–6 and, b25–26), is the conclusion of the section of Argument *II* in Part *A* (266a24–b27).

On the overall conclusion here, that what incites the first movement is indivisible and without parts or magnitude (267b18–19, b25–27; cf. 266a10–11), Apostle (p. 344 n. 48) notes that magnitude implies physical divisibility into parts: cf. *Ph.* 6.1. Here Aristotle's claim does not extend to logical indivisibility,

for which see esp. *Metaph.* 12.7, 1072a30–34, and 12.9. The present argument is repeated at *Metaph.* 12.7, 1073a5–11, and cf. 12.6, 1071b18–22, arguing the first substance must be immaterial since it must be free of any passive potential in order to be a first cause of movement.

As stated previously (see references directly above and also the general *Introduction* to this volume, pp. 5–9), this conclusion is less the culmination of *Physics* 8, or the “books on movement” (*Physics* 5–6 and 8) than a deferral. Since the first mover is immaterial it has no physical properties, and is not the object of further study within Aristotle’s physical science, the science of things subject to movement and the other factors involved in movement. The most significant conclusion of Bk 8, other than that the first mover is everlastingly unmoved and immaterial, is thus the implication of Part C of this chapter (and cf. Ch. 6), that the first body directly moved by this mover is the outer sphere of the cosmos, the diurnally rotating body containing the fixed stars, not the whole cosmos, since this first mover is not, as Plato had argued, the self-moving soul of the whole cosmos, nor the everlastingly moved atoms posited by Leucippus and Democritus, which they conceived as first, albeit moved, movers.

From the results of other books of the *Physics*, and the arguments of Chs. 1 and 3, we see Aristotle has also given reasons to reject, firstly, the Eleatic denial of movement as a subject for physics, secondly the Heraclitean claim that all things are always in movement, and, more importantly, both Anaxagoras’ and Empedocles’ views on the nature of the first moved bodies and the process and extent of cosmic movement. *Ph.* 8.6 and *Metaph.* 12 shows Aristotle nevertheless favours Anaxagoras’ identification of the first mover as intellect (νοῦς, *nous*), and Empedocles’ appeal to some kind of love, although ἐρῶς (*erōs*), not φιλία (*philia*), as its mode of causation. But that is a matter of θεολογία (*theologia*), first philosophy, not the philosophy of nature.

Physics 8: Complete Translation

This translation is assembled from that presented in the commentary, revised where necessary into the order of the text, except for Ch. 5, 256b13–27 (on which see the Note, pp. 155–156). Footnotes there are repeated here for convenience, slightly re-edited. Sentences divided between two passages of commentary are indicated by ellipses (... ...).

1, 250b11 Has movement at some time come to be, not having previously been, and again ceases to be so that nothing is in movement? Or did it neither come to be nor does it cease to be, but always was and always will be, and this belongs immortally and unstoppably to the things there are, as a kind of life of all things constituted by nature?

b15 Well all those who make claims about nature say that there is movement, because of their construction of the world (κοσμοποιεῖν) and because their whole study is about generation and destruction, whose existence is impossible without movement. But all those people who say there are limitless worlds (κόσμους), and that some worlds come to be and others cease to be, say there is always movement, since their generations and destructions must be in conjunction with movements of them. And all those others too, who say there is one world, (either always)¹ or not always, make assumptions about movement in accordance with their accounts.

b25 Now if it can be that once nothing was in movement, this must come about in (one of) two (possible) ways: for it is *either* as Anaxagoras states (for he says that everything there is was together at rest for an infinite time, and then mind introduced movement and separated things²), *or* as Empedocles does, that the things there are are in turn in movement and again at rest: in movement when friendship is making the one out of many, or enmity many out of one, but at rest during the times between, saying,

b30 *So, as they have learned to grow one from more,*
 and again, when the one grows apart, more are perfected,
251a1 *thus they come to be and have no steadfast life;*

1 Here the angle bracketed insertion indicates a textual supplement: see the *Note* in the commentary on 250b22 (pp. 21–22). Elsewhere angle brackets are used to indicate my supplements in the translation to clarify the meaning of the Greek text, except at 254a21 as here.

2 Anaxagoras B1.13.

*but as these nowhere cease exchanging throughout,
in this way they are always unmoving on their circle.*³

For we must suppose him to mean ‘as these ⟨nowhere cease⟩ exchanging’ from this condition to that. a5

Now we must consider how things are in this regard. For it is not only advantageous to see the truth with regard to the study of nature, but also with regard to the project concerning the first principle. Let us begin from our earlier definitions in the works on nature.⁴

Now we say movement is the activity of the movable as movable.⁵ Thus there must exist things that can be moved with each kind of movement. Quite apart from the definition of movement, anyone would agree that what is capable of being moved with each movement is so moved, for instance that the alterable is altered, and what can change place is transported, so that something must first be burnable before it is burnt, and capable of burning something before it burns it. So these things too must either have come to be, having once not been, or be everlasting. Now then if each movable thing had come to be, before a given change another one would necessarily have come to be, a movement in which what was capable of being moved or causing movement came to be. a10
a15
a20

On the other hand it seems unintelligible if they always pre-existed as beings when there was no movement, as soon as you turn your mind to it; and furthermore when you draw out the implications it inevitably turns out all the more so. For if, when there are both things capable of being moved, and those capable of causing movement, at one time there is going to be something first causing movement and another thing being moved, while at a different time nothing and instead it is at rest, then this⁶ must change beforehand. For there would have been something responsible for the resting.⁷ For rest is a privation of movement. As a result, before the first change there will have been a prior change. For some things cause movement in a single way and others also cause a25

3 Empedocles B17.9–13 = B26.8–12.

4 *Ph.* 1–4 (see Ross, pp. 1–6, esp. 4).

5 See *Ph.* 3.1, 210a10–11 and 3.1–3 *passim*.

6 Ross (p. 688) and Cornford (1934, p. 274 n. a): the movable; Graham (1999, p. 2): the mover. The latter, though logical, is grammatically improbable. Perhaps τοῦτο means ‘this *circumstance*’ (see next note).

7 Aristotle seems to mean here just that there must have been some reason of some kind for the capacities to cause movement and be moved not to operate immediately, and that circumstance must have changed before movement occurred; see further the *Analysis and Commentary* (pp. 28–29).

a30 the opposite movements, for instance as fire heats but does not cool, whereas knowledge, while one, seems to be of both opposites. Now even in the former case there seems to be something of a similar manner. For what is cold heats, by being reversed and departing, just as the knower willingly also errs, when he uses his knowledge the opposite way.

251b1 Well in any case, all those things that are capable of affecting and being affected, or of causing movement, and others of being moved, are not capable in all respects, but only when approaching each other in a given condition. Consequently when the one approaches it causes movement and the other is moved, that is to say, when it is the case that the one is capable of causing
b5 movement and the other of being moved. Well then, if things were not always in movement, it is clear that they were not in such a condition that the one could be moved and the other could cause the movement, but one of them needed to change. For this must happen among relative things, as for instance if what was not double is now double, the terms must change, and if not both,
b10 at least one. Thus there will be some change before the first.

In addition to this, how will there be 'before' and 'after' if there is no time? Or time if there is no movement? Now if time is the number of movement, or a certain movement, if indeed there is always time, movement too must be everlasting. But in fact apart from one fellow, everyone seems to be in
b15 agreement about time, at least. For they say it is ungenerated. And on this basis Democritus in fact demonstrates that it is impossible for everything to have been generated, since time, he says, is ungenerated. But Plato alone generates it. For he says that it has been generated together with the heavens, and that the heavens have been generated. Well, if it is impossible for time to be, and to
b20 think of it, without the 'now', and 'now' is an intermediate, containing both a beginning and an end together, a beginning of time that will come, and an end of past time, there must always be time. For the last part of the final time that is supposed will be in some 'now' (for it is not possible to suppose anything in
b25 time without 'now'), so that since 'now' is a beginning and an end, there must be always time on both sides of it. But in fact if actually there must be time, clearly there must be movement too, if indeed time is a feature of movement.

The account is the same regarding the fact that movement is indestruc-
b30 tible. For just as, in the case of a movement coming to be, it turned out that there was some change before the first, so here there is one after the last. For something doesn't stop being moved and being movable jointly, for instance burning and being burnable (since it is possible for something not burning to
252a1 be burnable), nor does something stop causing movement and being capable of causing movement jointly. And accordingly what is destructive will need to be destroyed when it has destroyed. And what is destructive of this, again later.

For of course destruction is a change. Now if this is impossible, clearly there is everlasting movement, instead of it having been at one time but not at another. For to talk about it that way seems more like fiction. a5

And similarly too, \langle it is fictitious \rangle to say that this is just the nature of things, and that you have to believe this is the principle, which it seems that Empedocles would say, that it is a necessary feature of things that friendship and enmity in turn take power and cause movement, and they rest during the time in between, —and perhaps those like Anaxagoras who appoint one such principle would also say so. a10

But in fact there is nothing disorderly in things that are natural and accord with nature. For in all cases nature is responsible for order. There is no proportion ($\lambda\acute{o}\gamma\omicron\nu$) in the ratio of the infinite to the infinite, but every order is a proportion. To be at rest for an infinite time, then at some moment to be moved, and for there to be no distinguishing feature of this, that it happens now rather than previously, and that furthermore it has no order, is no longer the product of nature. For what is natural is either simple, and not one way at one time but otherwise at another (as for instance fire is transported upwards, and not just at one time but at another not), or else there is a reason ($\lambda\acute{o}\gamma\omicron\nu$) why it is not simple. a15

Hence it would be better as Empedocles says, and anyone else who has said that this is the case, that the whole is in turn at rest and then again in movement, since that at least has some order to it. But even this the speaker must not say alone: he must give an explanation of it, and not suppose anything, nor make an irrational ($\alpha\lambda\omicron\gamma\omicron\nu$) postulate, but provide an argument from examples or a demonstration. For the principles he supposes are themselves not explanatory, nor is this⁸ the essence of friendship or enmity, but combination is characteristic of one and separation of the other. And if he is to specify as well that they alternate, he should state the circumstances in which they do so, just as he should say there is one thing that combines people, friendship, and that enemies flee one another. For he supposes that this also is the case in the whole world, since it is evident in some circumstances. He also lacks a reason for the claim that the alternation is over equal periods of time. a20 a25 a30

But universally to think that it is a sufficient principle, if something always either is so or comes to be, is not a correct assumption. Democritus bases his explanation of nature on this, that previously also things came to be this way: he does not judge it appropriate to seek for a principle of its being everlasting, speaking correctly for some cases but not for everything. For certainly the triangle always contains angles equal to two right angles, but all the same a35 252b1

8 I.e., to immediately cause both movement and rest.

there is some distinct explanation of this everlastingness; nevertheless of those principles that are everlasting there is no distinct explanation.

b5 Well then, let this be our complete account regarding the fact that there neither was nor will be a time when movement either was not or will not be.

2, 252b7 It is not difficult to refute objections to this. It might seem most possible that movement exists, having once not been at all, to those who start from the following considerations in their investigation: first, that there is no everlasting
b10 change; for every change is naturally from something into something, so that necessarily as a boundary for each change there is the opposite condition into which it comes to be, and nothing is moved boundlessly.

Next, we see that it is possible for something to be moved that is neither in movement nor has any movement within itself, for instance in the case of lifeless beings: although neither any part nor the whole of these is in movement,
b15 but rather at rest, at some moment it is moved. But it would have been fitting for it either always to be in movement or never, if in fact movement does not come to be after having not existed. And it is most particularly clear that this kind of thing is so in the case of living beings. For sometimes when there has been no movement in us, and we were quiet, nevertheless at a certain moment we
b20 are moved, and a principle of movement comes to be within us from ourselves, even if nothing outside moves us. For we do not see this happening the same way in the case of lifeless beings, but on each occasion something else outside moves them. But we say an animal is that which moves itself. Consequently if it is ever at complete rest, movement could come to be in something motionless
b25 from itself and not from outside. But if this can come to be in an animal, what prevents the same thing from also happening with respect to the whole of things? For if it occurs in a small structure (*χόσμιον*), it also does in a large one. And if in the cosmos, also in the infinite, if in fact it is possible for the infinite as a whole to be moved and to rest.

Now the first of these points stated is correctly stated, that there is no move-
b30 ment that is the same forever and one in number into an opposite condition. This is perhaps necessary, if in fact it is not possible for the movement of one and the same thing to be always one and the same. I mean, for instance, whether there is one and the same sound, or always a different one, from one
b35 string that remains in the same condition and in movement. But nevertheless, 253a1 whichever is the case, nothing prevents some movement being the same by being continuous,⁹ and *<so>* everlasting. This will be clearer from what follows.

9 I.e., not between opposites.

But for something not in movement to be moved is not at all strange, if at one time what moves it from outside is there, and at another time not. Yet how this could be must be investigated, I mean such that the same thing at one time is moved, and at another not, by the same thing that is capable of inciting movement. Someone saying this is puzzled about nothing other than why some beings are not always at rest and others always in movement. a5

But the third point would seem to contain the greatest puzzle, what happens in the case of living beings, when movement comes to be in them which previously was not. For an animal that previously was at rest thereafter walks, while nothing outside moves it, as it seems. But this is false. For we always see some intrinsic part of the animal in movement. But the animal itself is not responsible for the movement of this—rather it is the surroundings perhaps. We say it moves itself not with every movement, but locomotion. So nothing prevents, and perhaps rather it is necessary, that many movements come to be in the body caused by the surroundings, and some of these move the mind or desire, and that then moves the whole body, as for instance happens during sleep. For when there is no movement of perception in them, but there is some movement, animals wake up. In any case it will be clear about this too from what follows. a10 a15 a20

The beginning of our investigation is just that which also addresses the difficulty previously discussed, why some beings are sometimes in movement and at other times at rest again. For either everything must be always at rest, or everything must be always in movement, or some things in movement and other things at rest; and in the latter case again, either the things in movement must be always in movement, and those at rest always at rest, or everything is of such a nature as to undergo both movement and rest in a similar way, or there is again also a third possibility left. For it is possible that some beings are always motionless, others always in movement, and yet others participate in both conditions. And the latter is just what we should say. For this encompasses the solution to all the difficulties involved, and is the goal we have for this project. 3, 253a22 a25 a30

Now the position that everything is at rest, and to search for an argument for this, ignoring perception, is a kind of intellectual weakness, and a dispute in effect about a whole subject, not some part of it; and not just with the physicist, but with all kinds of knowledge, effectively, and all beliefs, since they all deal with movement. Moreover just as in discussions of mathematics objections about the principles are of no interest to the mathematician, and similarly too in all other cases, so also those about the present subject are of no interest to the physicist. For his presupposition is that nature is a source of movement. a35 253b1 b5

In effect, while it is false, too, to say that everything is in movement, it is less contrary to the discipline than in the previous case. For while nature is taken to be a source of rest no less than of movement in natural things,¹⁰ nevertheless movement is a natural phenomenon. And some people say not that some things are in movement and others not, but that everything always is, although our perception does not detect this.¹¹ It is not difficult to answer these people, despite the fact that they do not define clearly what kind of movement they mean, or whether all kinds.

For it is not possible either to grow or to shrink away continuously, but there is also the midpoint in each case. And the explanation is similar to that of dripping wearing rocks away, and plant growth breaking them apart. For it is not the case that if the dripping displaces or removes a certain amount, it will previously remove half in half the time. Rather, like people hauling ships, here too, this many drips move this much, but some part of them will not move so much in any time. So while what is removed is divisible into very many parts, none of them is moved separately, but only altogether. So clearly it is not necessary that something is always disappearing, just because the shrinking is infinitely divisible, but rather it disappears as a whole at some time.

It is also similar in the case of any kind of alteration. For an alteration is not infinitely separable into parts just because what is being altered is so, but rather, often it happens all together, as for instance freezing does. Moreover when something has become ill, a period of time must transpire in which it will be healed, and it cannot change at the limit of the time; and it must change to health and not to anything else. As a result, to say that it is altered continuously is to dispute too much what is obvious; for alteration is into the opposite. And a stone becomes neither harder nor softer; ...

... and with regard to transportation, it would be amazing if a stone's being transported down or resting on the earth had escaped notice. And moreover earth and each of the others of necessity rest in their proper places, but are moved by force out of them. So given that some of these are in their proper places, necessarily not all of them are being moved in place.

10 See *Ph.* 2.1, 192b20–23; Graham (1999) translates ἐν τοῖς φυσικοῖς (253b8) as ‘in the *Physics*’ (and similarly Wicksteed), but the phrase seems to have the same role as ἐν ᾧ ὑπάρχει πρῶτως καθ’ αὐτὸ καὶ μὴ κατὰ συμβεβηχός at 192b22–23—nature is not a principle of movement or rest in craft products, as such.

11 See Graham (1999, pp. 66–67) for discussion of whether and how far Aristotle attributed this view to Heraclitus, with references.

So on the basis of these and other similar considerations one could have confidence that it is not possible either for everything to be in movement or everything to be at rest.

But in truth nor is it possible for some things to be always at rest and others always in movement, yet nothing sometimes at rest and sometimes in movement. In these cases, just as in those mentioned before, it must be stated that it is impossible (for we see the changes mentioned¹² happening in the same cases); and in addition to this, because anyone disputing it is resisting what is obvious. For there will be no growth; nor will there be forced movement, unless something is moved against nature that was previously at rest. Then this account annihilates generation and destruction; and in fact being moved seems to practically everyone to be a kind of generation and destruction; for something comes to be that, or in that place, to which it changes, and that from which it changes is destroyed, or its presence there is destroyed. As a result it is clear that some things are in movement (sometimes), and others at rest sometimes.

We should now relate to our earlier discussions the claim that all things are sometimes at rest and sometimes in movement; and we should make a start from what has now been distinguished, the same start we began from before. For in fact either everything is at rest, or everything is in movement, or some beings are at rest and others in movement; and if some are at rest and others in movement it is necessary that either everything is sometimes at rest and sometimes in movement, (or some things are always at rest and others always in movement,)¹³ or some things always at rest, others always in movement, and others sometimes at rest and sometimes in movement.

Well then, it has actually been stated previously that it is not possible for everything to be at rest, but let us also state it now. For if the situation is actually in truth just the way some people say, that what there is is unlimited and motionless,¹⁴ nevertheless it certainly does not *appear* so in perception, but rather, that many beings are in movement. Then if indeed this is a false belief, or at all a belief, there is actually movement, both if it is an apparition and also if it seems sometimes so and sometimes otherwise; for an apparition and a belief seem to be kinds of movement.

But to engage in an investigation of this, and seek an account of something regarding which we are in a better situation than to need an account, is to be a

12 I.e., changes between rest and movement (thus Ross, p. 693).

13 Supplement by Ross following Prantl (cf. 253a26–27).

14 The view of Melissus (see e.g., *Ph.* 1.2, 184b15–16, 185a32–b5, cf. b16–17).

poor judge of what is better and worse, reliable and unreliable, and a principle and not a principle.

a35 But similarly it is impossible also that everything is in movement, or that
254b1 some things are always in movement and the others always at rest. For with regard to all these there is one sufficient assurance; for we see that some things are sometimes in movement and sometimes at rest.

As a result it is clear that it is similarly impossible that everything is at rest, that everything is continually in movement, and that some things are always in movement and the others always at rest. So it is left to observe whether all
b5 things are of the kind that are moved and at rest, or whether some are so, while others are always at rest and others again always in movement. And the latter is what we must demonstrate.

4, 254b7 Among things that incite movement and things moved, some incite movement and are moved incidentally, and others do so intrinsically (καθ' αὐτά), incidentally, for instance, all those that do so by belonging to things that incite
b10 movement or are moved, and those that do so in respect of a part; and intrinsically all those that do so neither by belonging to what incites movement or is moved nor by a part of themselves inciting movement or being moved. Among things that do so intrinsically some are moved by themselves and others by something else, and some naturally and others by force and unnaturally.

254b15 For what is moved by itself is moved naturally, as each of the animals is (for each animal is moved by itself, and we say that all those things with a source of movement in themselves are moved naturally: for this reason the animal as a whole moves itself naturally, although the body can be moved both naturally
b20 and unnaturally; for it makes a difference what kind of movement it happens to be moved with, and what kind of element it happens to be constituted from). And of things moved by something else some are moved naturally and others unnaturally, as earthen things are moved upwards unnaturally and fire downwards, and furthermore the parts of animals are often moved unnaturally, contrary to their postures and manners of movement.

254b25 It is particularly obvious in the case of things moved unnaturally that what is moved is moved by something because of its being clearly something moved by something else. And next after things moved unnaturally, it is obvious that among things moved naturally those moved by themselves, as are animals, are moved by something; for it is not unclear whether it is moved by something, but rather how one should distinguish within it what incites the movement
b30 and what is moved. For just as in boats and things not constituted by nature, so also in animals it seems that there is distinctly that which incites movement and that which is moved, and that this is how the whole moves itself.

But the greatest difficulty is the remaining part of the division stated last. For among things moved by something else we classified some as moved unnaturally, and the rest are left to be classified by contrast as moved naturally. These latter are those which would seem to provide difficulty as to what they are moved by, such as do light and heavy things. For they are moved by force to their respective opposite places, but naturally to their own proper places, what is light upward and what is heavy downward. But the answer to the question by what is not in this case obvious, as it is whenever they are moved unnaturally. b35
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For it is impossible to say that they are moved by themselves, since this is characteristic of animals and distinctive of living beings, and they would be able to stop themselves. (I mean this in the sense that if something is responsible for its own walking, it is also responsible for its own not walking.) As a result, if for fire to be transported upward is up to it itself, it is clear that it is up to it also to be transported downward. But actually being moved with only one movement by themselves is unreasonable, if in fact they move themselves. Again, how can something continuous and of a single nature move itself? For insofar as it is one and continuous not by touch it is unaffected, but insofar as it is separated (internally) one part naturally acts and another is affected. Thus neither does any of these things move itself (since they are of a single nature), nor does anything else continuous. Rather in each case what incites movement must be distinct in relation to what is moved, as we see in the case of lifeless things, whenever something alive moves one. a10
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Well then, it turns out that even these things are always moved by something. This might become obvious if we distinguish the causes. It is also possible to apply what has been said to the case of the things that incite movement. For some of them are capable of inciting movement unnaturally, as a lever is not naturally capable of moving what is heavy, whereas some are naturally capable, as what is actually hot is capable of moving what is potentially hot, and similarly in all other cases like these. And what is potentially of some quality or some amount or somewhere is similarly naturally capable of being moved, when it contains such a principle within itself not incidentally (for the same thing could be both of some quality and some amount, but the one is incidental to the other and does not belong to it intrinsically). Accordingly fire and earth are moved by something by force when they are moved unnaturally, but naturally, when being potentially so-and-so, they are moved to their own actualities. a20
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But the fact that what is potentially has more than one meaning is responsible for it not being obvious what things like this are moved by, such as fire being moved upwards and earth downwards. The man learning, and the man

a35 who already has the knowledge but is not active, are potentially cognisant in
 255b1 different ways. When what is capable of acting and capable of being affected
 are together, what is potentially so-and-so always becomes actually so-and-so,¹⁵
 as that which learns, from being potentially so, becomes potentially something
 other (for the man with knowledge but not contemplating is in a way poten-
 tially cognisant, but not in the same way as before he learned), but when he is
 in this condition, if nothing prevents it, he is active and contemplates, or else
 b5 he is in the contrary condition, that is, in ignorance. This is similar also in the
 case of natural things. For what is cold is potentially hot, and when it changes it
 is now fire, and it burns (something) unless something prevents and obstructs
 it. It is also similar concerning what is heavy and light. For from being heavy
 b10 it becomes light, as from water does air (for it was first this potentially), and
 now it is light and is immediately active, unless something prevents it. But the
 activity of what is light is being somewhere, that is upward, and it is prevented
 when it is in the opposite place. And this is similar also in the case of a certain
 amount, and a certain quality.

b15 Yet what is sought is why light and heavy things are moved to their own
 places. The reason is that they are naturally directed to somewhere, and that
 is the essence of light and heavy, the one defined by being upward, the other by
 being downward. But something is potentially light or heavy in more than one
 way, as has been stated. Both when it is water, it is in one way potentially light,
 b20 and when it is air, it is still in a way potentially light. For if it is obstructed, it may
 not be upward,¹⁶ but if what obstructs is removed, it is active and every time
 it becomes further upward. Similarly too, what is of a certain quality changes
 to being actually so. For that which is cognisant immediately contemplates
 unless anything obstructs it. And what is a certain amount is extended unless
 something prevents it.

b25 In one way someone who moves what is in the way and prevents movement
 moves (what was previously obstructed), but in another way he does not,
 such as someone who pushes a column out of the way or who removes a
 stone from a wineskin (filled with air) under water. For he moves (what was
 obstructed) incidentally, just as a rebounding ball is moved not by the wall but
 b30 by the thrower. Well then it is clear that none of these moves itself, yet has a
 principle of movement, not of inciting movement or of acting, but of being
 affected.

15 Omitting ἐνίοτε (255b35) with Ross.

16 Removing Ross's parentheses at 255b19–20, and replacing the following raised point with a comma.

Accordingly, if everything moved is moved either naturally or unnaturally and by force, and everything moved by force and unnaturally is moved by something, that is by something else, and, again, among things moved naturally both those things moved by themselves are moved by something, and also b35 those not moved by themselves, such as light and heavy things (since they 256a1 are moved either by what generates them and makes them light or heavy, or by what releases things that obstruct and prevent their movement), then everything moved would be moved by something.

This is the case in two ways. For each thing moved is moved either not because 5, 256a4 of the very thing that incites the movement, but because of another thing that moves what incites movement, or because of that very thing (that moves it), and this is either the first thing after what ultimately moves it,¹⁷ or through a number of intermediaries, just as the staff moves the stone, and is moved by the hand moved by the man, while he no longer incites movement by being moved by something else. We say both incite movement, both the first and last movers, but more so the first. For that moves the last, but this does not move a10 the first, and without the first the last will not incite movement, but that will without this, just as the staff will not unless the man moves it.

Now if (i) everything in movement must be moved by something, and either (ii.α') by something moved by something else, or (ii.β') not; and (if it is the case a15 that) (iii), if by something else (= ii.α'), there must be some first thing inciting movement which is not moved by something else (cf. ii.β'), and (if it is the case that) (iv), if the first is like this, there must be no different mover for it (for it is impossible that a series in which each member itself incites movement while being moved by something else continues to infinity, for there is nothing first in an infinite series)—well then if (i) everything moved is moved by something, a20 and if (v) what first incites movement is moved, but not by something else, it must be moved by itself.

It is also possible to reach the same conclusion as follows. For everything that incites movement both moves something and by means of something. For either what incites movement does so by means of itself, or by means of something else, as a man does himself, or by means of his staff, and the wind knocks something down either itself or the stone it pushes does. But that by means of a25 which something incites movement cannot do so without that which incites movement by means of itself. But if something incites movement by means of itself, there is no need of anything else by means of which it incites movement,

17 I.e., the immediately adjacent agent to what is ultimately moved.

whereas if that by which it incites movement is something different, there is something that will incite movement not by means of something, but by itself, or else they will form an infinite series. So if something moved incites movement, there must be a stopping point and it must not form an infinite series. For if a staff incites movement by being moved by a hand, the hand moves the staff. But if something else incites movement by means of this ⟨hand⟩,¹⁸ that which moves this ⟨hand⟩ is something different. Now when at each stage a different thing incites movement by means of something, there must be prior that which incites movement by means of itself. So if this is in movement, but what moves it is not anything else, it must move itself, so that, according to this account too, either what is moved is immediately moved by what moves itself, or it comes to this at some point.

In addition to what has been said, the same thing will turn out to be the case if we consider it as follows. For if everything in movement is moved by something in movement, either this is true of things incidentally, so that what incites movement is in movement, but does not incite movement because it is itself in movement, or not, and it is true of things intrinsically.

So firstly, if it is incidentally true, there is no need that what incites movement be in movement. And if this is so, it is clear that at some point of time no beings at all may be in movement. For what is incidental is not necessary, but may not be. Now if we assume what is possible, nothing impossible will follow, although perhaps a falsehood. Yet it is impossible that movement not be, for it has already been proven that there must always be movement.

[See the end of the chapter for 256b13–27]

But in fact, if what incites movement is not moved incidentally but necessarily, and ⟨again⟩ if it were not moved it could not incite movement, ⟨then⟩ the way what incites movement is moved, insofar as it is moved, must either be with the same form of movement, or with another. I mean that either what heats is itself being heated, and what heals is being healed, and what transports transported, or what heals is being transported, and what transports is increased. But it is obvious that this is impossible. For one should discuss this by distinguishing individual cases, such as that if something is teaching geometry, this same thing is being taught geometry, or if something is throwing things, it is being thrown with the same kind of throw.

Alternatively it is not like this, but each is moved with a different kind of movement, such as what transports being increased, and what increases this being altered by something else, and what alters this being moved with

¹⁸ See the *Note* (p. 118) on the reading here.

some different movement. But this must come to an end, for the kinds of movement are limited. And to come round in a circle and to say that what alters is transported is to do the same thing as one would if he immediately said that what transports is transported and what teaches is taught (for it is clear that everything in movement is moved also by the higher mover, and more so by the mover that is prior). But in fact this is impossible, for that which teaches turns out to be learning, and of these two one must not have, and the other have, the knowledge. a10

But still more than this, it is unaccountable that it turns out that everything capable of inciting movement is moveable, if in fact everything in movement is moved by something in movement. For it will be moveable just as if someone were to say that everything capable of healing is healable, and what is capable of building is buildable, either directly, or through several intermediaries. I mean as if everything capable of inciting movement is moveable, but not moveable with the same movement to which it incites its neighbour, but with a different one, such as if what is capable of healing is capable of learning; but then by ascending (through its causes) this will come at some point to the same form of movement, as we said before. The one case is impossible, the other a fantasy, for it is a strange (proposal) that what is capable of altering something is necessarily capable of increase! Thus it is necessary that what is moved is not in every case moved by something else itself in movement. Thus it will come to an end. As a result, what is first moved will either be moved by something at rest, or move itself. a15 a20 a25

But in fact even if it were necessary to investigate whether what moves itself or what is moved by something else is responsible for movement as its principle, anyone would pick the former. For what is so in respect of itself always has a prior responsibility for what is so in respect of something different. a30

As a result, we should take another starting point, and investigate this: if something moves itself, how does it incite movement, and in what manner? Well everything moved must be divisible into infinitely divisible parts. For this has been demonstrated previously in the general account of nature, that everything intrinsically moved is continuous. 257b1

Now it is impossible for that which moves itself to move itself throughout,¹⁹ for it would be transported and transport, as a whole, on the same journey, while being one and indivisible in form, and it would be altered and alter, so that it would teach and learn jointly, and heal and be healed with the b5

19 $\pi\acute{\alpha}\nu\tau\eta$ (257b2) seems clearly to mean 'at every point' rather than 'in every respect', as Apostle (p. 322 n. 27) interprets it.

same health. Furthermore it has been established that what is in movement is the moveable, and this is in movement by being potentially, not actually, so, and what is potentially so advances towards actuality, and movement is the incomplete actuality of the moveable. And that which incites movement
 b10 is already actually so, as what is hot heats, and overall what has the form generates. As a result the same thing jointly and in the same respect will be both hot and not hot. And similarly also each of the rest of things of which the mover must have the same name (will be both so and not so). Thus one part of what moves itself moves, and another part is moved.

That there is nothing that moves itself in such a way that each of the two
 b15 parts is moved by the other is obvious from the following. For firstly there will be no first mover, if each part is (indirectly) going to move itself, (for what is prior is more responsible for the being moved than what is subsequent, and will more properly incite the movement; for we saw it was possible to incite movement in two ways, the one where what incites movement is itself moved by something else, the other where it does so by itself; and what is further from
 b20 what is moved is nearer to the principle than the intermediate mover is).

Furthermore what incites movement need not be moved if it is not moved by itself. Thus the other moves it in return (only) incidentally. So then I can take the possibility of it not moving (the first). Thus the one is (only) moved, and the mover is unmoved. Furthermore what incites movement need not be moved in return, but either something unmoved must incite movement, or something
 b25 moved by itself, if there must always be movement. Furthermore (in the latter case) it would be moved with the movement it incites, so that what heats is being heated.

But in fact neither one part, nor several parts of what first moves itself each move themselves. For if the whole is moved by itself, it is either moved by
 b30 something belonging to itself or the whole is moved by the whole. Now if it is by some part being moved by itself, this would be that which first moves itself. (For even if it is separated this will move itself, but the whole no longer will.) But if the whole is moved by the whole, these parts would move themselves incidentally, so that, if it is not necessary, let us assume that they are not moved
 258a1 by themselves.

Thus of the whole (represented by this line) the one part will incite movement while being unmoved and the other will be moved. For only so is it able to be self-moved.²⁰ Further if the whole moves itself, one part of it will incite

20 Rashed (p. 556) argues that Alexander (fr. 635 Rashed) shows that this sentence is a gloss intruding into the text.

movement, and the other will be in movement. Thus AB will be moved by itself and by A.

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And since one thing incites movement while being moved by something else, and another while being unmoved, and one thing is moved while inciting movement, and another while moving nothing, what moves itself must be composed of what is unmoved but incites movement, and in addition of what does not necessarily move anything, but only whatever it does by chance. For let A be what incites movement while being unmoved, and B be what is moved by A and moves that to which C is applied, and this be what is moved by B but does not move anything. For since it will come at some point through several intermediaries to C, let it be through only one. The whole ABC moves itself. But if I remove C, while AB will move itself, A inciting movement and B being moved, C will not move itself, nor be in movement at all. But in fact neither will BC move itself without A. For B incites movement by being moved by something else, not by being moved by any part of itself. Thus AB alone moves itself. Thus what moves itself must contain what incites movement but is unmoved, and what is moved but does not necessarily move anything, ...

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... either both touching each other or one the other. So if what incites movement is continuous (for what is moved must be continuous), each will touch the other.

Now it is clear that the whole does not move itself by one part of it being of such a kind as to move itself, but it moves itself as a whole, both being moved and inciting movement by part of it being the mover and part what is moved. For it does not incite movement as a whole, nor is it moved as a whole, but the ⟨line to which⟩ A ⟨is applied⟩ incites movement, and that ⟨line to which⟩ B ⟨is applied⟩ alone is moved. [But C is no longer moved by A, for it is impossible.²¹]

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But this involves a problem, if someone removes some part of the ⟨line to which⟩ A ⟨is applied⟩ (if what incites movement but is unmoved is continuous), or some part of the ⟨line to which⟩ B ⟨is applied⟩. Will the remnant of the ⟨line to which⟩ A ⟨is applied⟩ incite movement, or that of the ⟨line to which⟩ B ⟨is applied⟩ be moved? For if so, the ⟨line to which⟩ AB ⟨is applied⟩ would not be one moved primarily by itself; for when ⟨a line length⟩ has been removed from the ⟨line to which⟩ AB ⟨is applied⟩, the remaining ⟨line to which⟩ AB ⟨is now applied⟩ will still move itself. Rather, nothing prevents either, or one of them, what is moved, from being divisible potentially, but indivisible actually, and, if it is divided, from no longer being something with the same nature. As a

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21 Sc. for C to be part of what moves itself (cf. 258a17–18), but excised by Ross (see p. 703) as the gloss of a scholar who thought ‘B alone’ meant B without C, not B without A.

result, nothing prevents it being found primarily in things that are potentially divisible.

b₅ Therefore it is obvious from this that what primarily incites movement is unmoved. For whether ⟨the series leading back from⟩ what is moved, but moved by something in movement, comes to an end immediately with the first thing and that is unmoved, or with something moved, but which moves and stops itself, in either case what first moves all things in movement turns out to be unmoved.

256b₁₃ And this result accords with reason. For three things are necessary, what is moved and what moves it and that by which it moves it. Then what is moved
b₁₅ must be moved, but it need not incite movement; but that by which something incites movement must both incite movement and be moved (for this changes with what is moved, since it is together in the same place with it. This is clear in the case of things that incite locomotion. For they must touch each other to
b₂₀ a certain extent). But what incites movement in such a way as not to be that by which ⟨it⟩ incites movement, is unmoved. And since we see the last thing, which can be moved but does not have a principle of movement, and what is moved, not by something else but by itself, it is reasonable, if not strictly necessary, that there is the third thing, which incites movement while being unmoved.

b₂₅ For this reason Anaxagoras speaks correctly in declaring intellect to be unaffected and unmixed, since in fact he makes it be the principle of movement. For only in this way could it incite movement while being unmoved and rule while being unmixed.

6, 258b₁₀ Since there must always be movement and it must not cease, there must be something everlasting that first incites movement, either one thing or many, and what first incites movement must be unmoved. The claim that each unmoved mover is everlasting is not relevant to the present account; yet, that
b₁₅ there must exist what is itself unmoved, outside all change, both essentially and incidentally, but capable of inciting movement in something different, is clear if we consider it as follows.

Let it be possible in some cases, if someone wishes, for things to be at some time and not be ⟨at another time⟩ without generation or destruction (for
b₂₀ perhaps, if anything without parts is at some time, and is not at another time, everything of this kind must be at one time and not be at another without change). And let it also be possible for some principles that are unmoved but capable of inciting movement to be at some time but not be at another.

Nevertheless, it is not at all possible for all of them ⟨sc. principles that are unmoved but capable of inciting movement to be at some time but not be at

another).²² For it is clear that things that move themselves have some cause of their being at some time and not at another time. For everything that moves itself must have magnitude, if nothing without parts is moved, while there is no necessity from what has been stated that what incites movement has magnitude. b25

For nothing unmoved that is not always there is responsible for things being generated and others perishing and this (process) being continuous, nor even, again, are these responsible for those, and different ones for these. For neither is each of these, nor all of them, responsible for movement being everlasting and continuous. For this status is (itself something) everlasting and of necessity, whereas these are all limitless and not things that are all together (at the same time). Well then, it is clear that, even though countless times over some unmoved movers, and many things that move themselves, perish and others are generated in turn, and this unmoved being moves that thing and another moves this, ... 259a1

... nevertheless there is something that surrounds them, and it is this, besides each thing, which is responsible for some things being and others not and for continuous change, and this is responsible for the movement of these things, and these for the movement of the rest. So, given that movement is everlasting, the first mover will also be everlasting, if there is one, and if there are more, there are more everlasting things. a5

But we ought to think there is one rather than more, and a limited number rather than unlimited. For if the same results follow, on each occasion we should rather assume what is limited. For in natural things what is limited and better ought rather to exist, if it is possible. And in fact one is sufficient, which, as the first unmoved thing, being everlasting, will be the principle of movement for the rest of things. a10

It is also evident from the following that what first incites movement must be one everlasting thing. For it has been demonstrated that there must always be movement. And if it must be always, it must be continuous. For actually what is always must be continuous, whereas what is sequential is not continuous. But in fact if it is indeed continuous, it is one. And one movement is that incited by one mover and of one moved thing. For if now one thing and now another thing incite movement, the whole movement will not be continuous, but sequential. a15 a20

Well, from this one could be assured that there is something unmoved first, and again by taking a look at the principles.²³ It is evident that some beings are

²² See 258b20–22, immediately preceding.

²³ Following the text of Ross (cf. p. 706); see *Commentary* here (pp. 176–177).

sometimes moved and at other times at rest. And through this it has become clear that neither is everything in movement nor everything at rest nor some things always at rest and others always in movement, for those that alternate and have the power of being moved and of resting demonstrate the truth about this. Since things of this kind are clear to all, and we wish to demonstrate the nature of each of the other two, that some things are always unmoved and others always in movement, ...

... and by proceeding to this point, and establishing that everything in movement is moved by something, and that this is either unmoved or in movement, and if it is moved, either by itself or in each case by something else, we proceeded to the assumption that a principle of things in movement that is itself among things in movement is what moves itself, but among all things it is what is unmoved, ...

... and ⟨since⟩ actually we see that there are evidently things of this kind, that move themselves, such as the class of ensouled beings and that of animals, and these in fact gave the impression that perhaps movement is able to be engendered not having been at all, because we see this happening in these things (for having at one time been unmoved, at another they are in movement, as it seems), we must now establish this, that they move themselves with one movement, and not independently. For what is responsible is not innate, but rather animals have other natural movements within them, with which they are moved through themselves, such as growth, shrinking and breathing, with which each animal is moved when at rest and not being moved with the movement with which it is moved by itself.

What is responsible for this is the surroundings and the many things that enter it, as the food ⟨is responsible⟩ for some ⟨movements⟩.²⁴ For when it is being digested, they sleep, and when it is being distributed ⟨around the body⟩ they wake up and move themselves, while the first principle is outside, because of which they are not always moved continuously by themselves. For what incites movement is something else, itself in movement and changing in relation to each of the things that move themselves.

In all of these what first incites movement, and is responsible for each moving itself by itself, is moved, although incidentally. For the body changes place, so that what is in the body, and by means of leverage moves itself, also does. From this we can be assured that if there is any example of unmoved things that also move themselves incidentally, it cannot incite continuous movement.

24 Following Ross (p. 707).

As a result, given that movement must be continuously, there must be that which first incites movement while being unmoved even incidentally, if there is going to be, just as we said, some ceaseless and immortal movement in the things there are, and if what there is is going to remain in itself and in the same place. For if the principle remains the whole must also remain, being continuous, in relation to the principle. b25

Being moved incidentally by itself and by something else are not the same thing, for being moved incidentally by something else also takes place in some of the principles of all the things in the sky that are transported along multiple pathways,²⁵ but the other only takes place in destructible things. b30

But in fact if there actually always is something like this, something inciting movement but itself unmoved and everlasting, what is first moved by this must also be everlasting. 260a1

This is clear also from the fact that there could otherwise not be generation and destruction and change for the rest of things, unless something moved moves them. For what is unmoved always incites one movement and in the same way, since it does not itself change in relation to what is moved. But what is moved by what is indeed moved, but moved in this case by what is unmoved, because of its having now this and now that relation to things, is not responsible for the same movement, but because of its being in opposed places or forms it will cause each of the other things to be moved in opposite ways, and sometimes to be at rest, and at other times to be in movement. a5 a10

Now, from what has been said, what we were in fact puzzled by at the beginning has become evident, why it is not the case that everything is either at rest or in movement, nor some things always in movement and others always at rest, but some things are sometimes in movement and at other times not. For what is responsible for this is clear now, that some things are moved by something unmoved and everlasting, because of which they are always in movement, but others are moved by what is in movement and changing, so that they must also themselves change. But what is unmoved, just as was said, since it simply and continuously remains just as it is in the same condition, incites just one simple movement. a15

In any case, if we make in addition another start, the truth about this will be more evident. For we should investigate whether it is possible for any movement to be continuous or not, and if it is possible, what this movement is, and which is the first kind of movement. For it is clear, if indeed there must 7, 260a20

25 Removing Ross's comma after ἀρχαίς (259b30).

a25 be movement always, and this kind is first and continuous, that what first incites movement incites that movement, which must be one and the same and continuous and first.

Given that there are three kinds of movement, that in respect of magnitude, that in respect of an affection, and that in respect of place, which we call transportation,²⁶ the latter must be first. For it is impossible that there is
 a30 growth unless alteration already takes place. For in one way what is increased is increased by what is similar, and in another way by what is dissimilar. For what is opposite to something is called its food. And everything is added to something by becoming similar to it. Then the change into opposites is necessarily
 260b1 its alteration. But in fact if something is altered, there must be something that alters it and makes out of the potentially hot something actually hot. Then it is clear that what incites movement does not keep to a similar position, but at one time it is closer, but at another time further from what is altered. And this cannot take place without transportation. So if there must always be movement, there must always be transportation as the first kind of movement, and if there is a first and subsequent kind of transportation, there must be the first kind.

Moreover the principle of all ways of being affected is condensation and
 b10 rarefaction. For both being heavy and light, and soft and hard, and hot and cold are thought to be ⟨respectively⟩ kinds of thickness and thinness,²⁷ and condensation and rarefaction ⟨are thought to be respectively⟩ blending and separation, in respect of which the generation and destruction of substances is said ⟨to occur⟩. But things that are blended and separated must change place.
 b15 And indeed the magnitude of what is increased or diminished changes place.

Moreover from the following point too it will be clear to those who consider it, that transportation is first ⟨among movements⟩. For what is first can be spoken of in many ways in the case of movement too, just as in other cases. For something is called prior if, when it is not, the others are not either, but it will be ⟨even⟩ without the others; and something is called prior in time, and something prior in respect of substantiality.

b20 As a result, since there must be movement continuously, yet it could be continuously by being either continuous or sequential, but more so continuous movement, and it is better that it be continuous than sequential, and ⟨since⟩ we always suppose that what is better takes place in nature if it is possible, and that it is possible for it to be continuous ⟨but this will be proven subsequently;

26 I.e., locomotion (φορά, *phora*): on the translation see the *Introduction* to ch. 7 (p. 199).

27 For the punctuation and consequent supplement thereafter see Wagner (p. 688), replacing Ross's full stop with a comma.

for now let it be assumed), and that this can be no other movement than transportation, then transportation must be the first kind of movement. For there is no necessity that what is transported is either increased or altered, nor indeed that it is generated or destroyed, but none of these can be if there is no continuous movement, which what first incites movement incites. b25

Moreover it must be first in time. For it is possible for everlasting things to be moved only with this movement. Yet (someone might object that) transportation in the case of any one whatsoever of those things which have generation must be the last kind of movement. For after being generated first there is alteration and growth, and transportation is then a movement of things that have been completed. But a different thing moved in respect of transportation must be prior, which will also be responsible for the generation of the things that come to be, not something that comes to be, as what generates is prior to what is generated, since generation would (then) seem to be the first kind of movement for this reason, that the thing at hand must first come to be. But as it is, this is so in the case of any one of the things that come to be, but something prior to the things that come to be must be moved, itself a being and not what comes to be, and something different prior to this. But since it is impossible that generation is first (for then everything moved would be perishable), it is clear that none of the sequential movements is prior. I call sequential growth, then alteration and shrinkage and destruction. For all of these are subsequent to generation, so that if not even generation is prior to transportation, nor is any of the other changes. 261a1 a5 a10

In general, what is coming to be evidently lacks its completion and is on its way towards its principle, so that what is later in generation is prior in nature. But transportation belongs last to all things in generation. For this reason some living things are completely unmoved through lack, as are plants and many kinds of animals,²⁸ while it occurs in those which attain completion. As a result, if transportation belongs to a greater degree to those which have obtained their nature to a greater degree, this kind of movement also is first in relation to the others in substantiality, both because of this and because what is moved in being transported in comparison with other movements departs least from its substance. In respect of this kind of movement alone nothing changes from being, in the way that when something is altered it is changed in respect of its quality, and when it is increased and decreased it changes in respect of its quantity. a15 a20

28 See Ross (p. 710) for references to Aristotle's accounts of such zoophytes.

And it is particularly clear that what moves itself moves itself independently
 a25 with this movement in particular, movement in place; and indeed we say this
 is a principle of things moved and inciting movement, and first among what is
 moved, that which moves itself.

Well then, it is evident from this that transportation is the first kind of
 movement. But now it must be shown what kind of transportation is first.
 Jointly, by this procedure, what both now and previously was assumed will be
 a30 clear, that it is possible for some movement to be continuous and everlasting.

Now from the following it is clear that it is possible for none of the other
 movements to be continuous. For all <these> movements and changes are from
 one opposite to the other,²⁹ as, for instance, for generation and destruction
 a35 what is and what is not are boundaries, and for alteration the contrary affec-
 tions, and for growth and shrinkage magnitude and smallness, or completion
 and incompleteness of magnitude.

261b1 Movements³⁰ towards contraries are contrary movements. What is not
 always moved with a particular movement, but is previously, must previously
 be at rest. So it is evident that what changes will be at rest in the contrary condi-
 tion. And it is similar in the case of changes; for generation and destruction are
 b5 opposed simply, and a particular instance to a particular instance. As a result,
 if it is impossible to change jointly with the opposed changes, change will not
 be continuous, but there will be some time between them.

For it makes no difference whether the contradictory changes are contraries
 or not contraries, so long as it is impossible for them to be present together in
 b10 the same thing (for that is not at all relevant to the argument), nor if it is not
 necessary to rest in the contradictory condition and change is not something
 contrary to rest (for perhaps what is not does not rest, while destruction is into
 what is not), but only whether there is time in between. For thus the change
 b15 is not continuous. For neither is the contrariety relevant in the previous cases,
 but that they cannot occur together is.

But there is no need to be concerned that the same thing will be contrary to
 many things, such as movement to stopping and to movement in the contrary
 direction, but only to grasp this, that somehow the contrary movement is
 opposed to both the movement and to rest, just as the equal and the measured
 b20 are opposed to what exceeds and what is exceeded, and that it is possible
 neither for opposed movements nor opposed changes to occur together.

29 See the *Note* on 261a32–33 (p. 218).

30 The word κινήσεις must be supplied here from 261a33, given Aristotle's general doctrine
 that only *kinēseis*, not *metabolai* ('changes') are between contraries (τὰ ἐναντία, b1); see
 previous note.

Moreover in the case of generation and destruction it would actually seem to be completely absurd, if what was coming to be immediately had to be destroyed and did not last for any time at all. Consequently the other kinds of change can gain a confirmation from this, for it is natural that the situation is similar in all of them. b25

Let us now establish that there can be a particular ⟨movement⟩ that is unlimited, since it is one and continuous, and this is movement in a circle. For everything transported is moved either in a circle or a straight line or a combination of these, so that if either of the former two is not continuous, nor can that composed of both be so. 8, 261b27 b30

It is clear that what is transported in a straight line, which is limited, is not transported continuously; for it turns back. What turns back in a straight line is moved with contrary movements; for movement in place upward is contrary to movement downward, and movement forwards to movement backwards, and movement to the left to movement to the right, since these are the contraries of place. What a unified continuous movement is has previously been defined as that of one thing in one time and within what is undifferentiated in form (since there are three things: what is moved, as a man or a god is, and when ⟨it is moved⟩, as the time, and third that in which; this is either place or affection or form or size). But the contraries differ in form and are not one thing, and those of place are the previously stated differentiations. It is an indication that the movement from A to B is contrary to that from B to A, that they halt and stop each other if they happen together. And similarly in a circle, as the movement from A to B is contrary to the movement from A to C (for they halt ⟨each other⟩, even if they are continuous and no turning-back takes place, because of the contraries cancelling and preventing each other); by contrast sideways movement is not contrary to movement upward. a5 a10

But it is particularly obvious that it is impossible for movement on a straight line to be continuous, because what turns back must stop, not only on a straight line, but also if it is transported with circular movement. For it is not the same thing to be transported in circles and with circular movement.³¹ For it is possible for it at one time to continue being moved, and at another, when coming to the same point from which it set out, to turn back again. The a15

31 In order to clarify this distinction, in this passage alone I have used ‘in circles’ for Aristotle’s κύκλῳ (dative of manner), in contrast to κύκλον (internal accusative: ‘on a circular path’, ‘with circular movement’); elsewhere I have used the more literal ‘in a circle’ for the former.

confirmation that it must stop depends not only on perception, but also on reason.

262a20 The following is the principle: given three things, beginning, intermediate and end, the intermediate is both (beginning and end) in relation to each of the other two, and one in number but two in account. Moreover what is potentially and what is actually are different, so that any point at all of those between the extremities of the straight line is potentially the intermediate, but actually is not, unless (what is moved) divides it here, and having come to a stop again
a25 begins to be moved. And that is how the intermediate becomes beginning and end, beginning of the subsequent movement, and end of the first one (and I mean as if A, which is transported,³² stops at B, and again is transported to C). But when it is transported continuously it is neither possible for A to have come
a30 to be nor to have ceased to be at point B, but only to be (there) in the 'now', but in no time except in the whole of which the 'now' is the division.

(But if someone takes the position that it has come to be and ceased to be (at a point), then A, which is transported, will always be stopping; for it
262b1 is impossible for A jointly to have come to be at B and to have ceased to be (there). Thus these would be in different points of time. Thus there will be time in between. As a result, A will rest at B, and similarly at the other points, since
b5 the same account applies to them all. So when A, which is transported, uses B as an intermediate, and an end and a beginning, it must stop, owing to its making them two, just as if someone were in fact to think (of it there).) But it has ceased to be (only) at point A,³³ the beginning, and it has come to be (only) at C, when it finishes and stops.

For this reason that is what should also be stated in relation to the following
b10 difficulty that is involved. For if the line E (indicates) is equal to line G, and A is transported continuously from the extremity to C, and A is at point B jointly with D being transported from extremity G to H evenly and at the same speed
b15 as A, then D will arrive at H ahead of A at C.³⁴ For what sets off and leaves earlier must arrive earlier. For A has not come to be at B and ceased to be at B jointly, because of which it is late. For if they have taken place jointly, it will not be late; but (in fact) it will have to stop (at B). Thus we should not take the position that when A came to be at B, D jointly was in movement from extremity G (for if A
b20 is going to have come to be at B, its ceasing to be (there) will also be possible,

32 I.e. 'A' now names the body which was previously at point A (262a7).

33 As Graham (1999, p. 140) notes, Aristotle now uses 'A' not for the body but for the starting point on the line; although immediately hereafter again for the body.

34 On the implied diagram and scenario see the *Commentary* (pp. 242–243).

and not jointly), but rather it was there at a cutting of time, and not in a time. So it is impossible here to say this in the case of continuous movement, ...

... but we must say so³⁵ in the case of what turns back. For if the point H ⟨indicates⟩ were transported towards D and turning back were transported again downward, it has used the extremity to which D ⟨is applied⟩ as an end and a beginning, the one point as two.³⁶ Thus it must stop, and it has not come to be at D and departed from D jointly; for it would jointly be there and not be there in the same ‘now’. But in fact we must not propose ⟨in this case⟩ the solution previously ⟨given for passing through an intermediate point⟩. For it is not possible to say that the point H ⟨indicates⟩ is at D in a cutting ⟨of time⟩, and that it has neither come to be nor ceased to be ⟨there⟩. For it must come to an endpoint that is actually, not potentially. So while intermediate points are potentially, this is actually, and is the end ⟨of the path⟩ from below, and the beginning ⟨of the path⟩ from above, and thus similarly of the movements. Thus what turns back on the straight line must stop. Thus it is not possible for there to be continuous movement forever on a straight line.³⁷

We must answer in the same way those who raise the question of Zeno’s argument, whether it is necessary always to traverse the half, and these are infinite, while it is impossible to completely traverse the infinite; or as some people raise the question of this same argument in a different way, thinking it right jointly with being moved halfway first to count separately each half that comes about, so that when one has traversed the whole path it turns out that an infinite number has been counted, which is by common agreement impossible.

Now in our first discussion of movement we solved this problem through the fact that the time involved contains an infinity within itself. For there is nothing strange if someone traverses an infinity in an infinite time. The infinite occurs similar in the length and in the time. But while this solution is adequate in relation to the questioner (since the question was whether in a finite time it is possible to completely traverse or count an infinity), in relation to the subject and the truth it is not adequate. For if someone leaves aside the length and the question whether in a finite time it is possible to completely traverse an infinity, and makes this inquiry in the case of the time itself (for the time contains

35 I.e., that a body comes to be, and ceases to be, at a point at different times (cf. 262b17–22).

36 As Ross (p. 713) notes, the functional relationship between D and H has been reversed here, so that D represents a fixed point (i.e. G in the previous situation) and H a moving body.

37 Taking ἀίδιον adverbially: perhaps originally εἰς ἀίδιον, and thus perhaps supporting the word order of FHJ (Ross’s A).

infinite divisions), this solution is no longer adequate, but we need to state the truth, exactly as we did in the immediately preceding discussion.

For if someone divides the continuous ⟨line⟩ into two halves, he uses the one
 a25 point as two, since he makes it a beginning and an end. Both someone counting
 and someone dividing it in half does so. In the case of such a division neither
 the line nor the movement will be continuous, since a continuous movement
 is along a continuous path, while in what is continuous there are an infinite
 number of halves, although not actually, but potentially. But if he does this
 a30 actually, he will not make it continuous, but will stop ⟨the movement⟩, which
 it is clear is precisely what happens in the case of the man counting the halves,
 263b1 since he has to count the one point as two. For it will be the end of one half and
 the beginning of the other, if he does not count the continuous ⟨movement⟩ as
 one, but as two halves. As a result, we must say to someone asking the question
 b5 whether it is possible to completely traverse an infinity, either in a length or
 a time, that it is possible in a way, and in a way it is not. For it is not possible
 to traverse an actual infinity, but it is possible to traverse a potential infinity.
 For someone being moved continuously has traversed an infinity incidentally,
 but not simply, since the line incidentally contains an infinity of halves, but its
 substance and being is different.

b10 It is also clear that unless one makes the point in time that divides earlier and
 later always to belong to the later ⟨time⟩ regarding the subject, the same thing
 will be jointly something that is and is not, and, when it has become, something
 that is not.³⁸ So while the point is common to both, belonging both to earlier
 and later, and one and the same thing in number, in account it is not the same
 (since of one it is the end, and of the other the beginning); but regarding the
 b15 subject it always belongs to its later condition. The time is that to which ACB
 applies, the subject that to which D applies. This is white in time A, but in B
 not white. Thus in C it is white and not white. For in any part at all of A it is
 true to call it white, if throughout this time it was white, and in B not white.
 b20 But C is in both. Thus it should not be granted ⟨that it is white⟩ in every ⟨part
 of A absolutely⟩, but ⟨in every part⟩ except the last to which C applies. And this
 now belongs to what is later. And if it were becoming not white and the white
 was perishing in the whole of A, it has become ⟨not white⟩ or ⟨the white⟩ has
 perished in C. As a result, it is first true to call something white or not white
 in that time,³⁹ or else when it has become so it will not be so, and when ⟨the

38 What would both be and not be is the subsequent condition (παῖος, b15) which the subject has begun to be at the point in time divided from what preceded.

39 See the *Note* on 263b23 (pp. 258–259).

white) has perished it will be so, or it must be white and not white jointly, and in general terms something that is and is not. b25

But if whatever was previously not something that is must become something that is, and when it is becoming it is not, time cannot be divided into indivisible temporal units. For if, in A, D were becoming white, and has become and jointly is so in another adjacent indivisible time, B—if in A it were becoming, it was not, but in B it is—, there must be some becoming in between, so that there must also be a time in which it is becoming. 264a1

For the account will not be the same also for those who say there are no indivisible units, but during the time itself in which there was becoming, in the final point it has become and is, after which there is nothing adjacent or next in series. But indivisible times are in series. But it is clear that if it was becoming in the whole time A, there is no greater time in which it has become and was becoming than all of that in which it was only becoming. a5

These, then, and others like them, are the arguments specific to the subject by which one might be convinced; but to those investigating by general reasoning the case would seem to someone to turn out the same also on the following grounds. For everything continuously being moved, unless it is knocked aside by something, was also earlier being transported to that to which it came by transportation, such that if it came to B, it was also being transported to B, and not when it was nearby, but immediately when it began to be moved; for why <does it have that goal> now more than earlier? And similarly also in the other cases.⁴⁰ Now <let us assume> when something transported from A comes to C, it will again have arrived at A by being continuously moved. Thus when it is transported from A to C, then it is also being transported to A with a movement from C, so that it is transported jointly with contrary movements. For movements in a straight line are contraries. And it also jointly changes from that which it is not <yet> in. So if this is impossible, it must stop at C. Thus the movement is not one; for a movement separated by a stop is not one. 264a10 a15 a20

Furthermore this is obvious from the following more general points about all movement. For if everything moved is moved with one of the stated movements, and rests with one of the opposed forms of rest (for there was shown to be no other besides these), and what is not always moved with this specific movement (I mean all those that differ in form, and not one that is a part of the whole movement) must previously rest in the opposed form of rest (for rest is a privation of movement)—then, if movements in a straight line are contraries, and it is not possible to be moved with contrary movements jointly, what is a25

40 Ross (p. 715): i.e., in the other species of movement, increase/decrease and alteration.

a30 transported from A to C could not be transported jointly also from C to A; and
 since it is not transported jointly, but it will be moved with this movement, it
 must previously rest at C; for this is the rest opposed to the movement from
 264b1 C. Therefore it is clear from what has been said that the movement will not be
 continuous.

And furthermore there is also the following argument, which is more specific
 to the subject than those that have been stated. For jointly what is not white has
 perished and it has become white. So if the alteration to white and from white
 b5 is continuous and it does not remain ⟨white⟩ for some time, jointly what is not
 white has perished and it has become white, and it has become not white; for
 the same time will be that of ⟨all⟩ three.

Furthermore it is not the case that if the time is continuous, so is the move-
 ment; rather it is in series. But how could the extreme point of the contraries
 be the same, such as the extreme point of whiteness and blackness?

b10 Movement on a circumference will be one and continuous. For nothing
 impossible follows, since what is moved from A will jointly be moved to A on
 the same projected course⁴¹ (for it is also in movement to that to which it has
 come), but it will not be moved jointly with contrary or opposed movements.
 For not every movement to this given point is contrary or opposed to movement
 b15 from this point, although movement on a straight line is so contrary (for this
 involves contraries in place, such as the ⟨end⟩ points on a diameter, since these
 are most distant), whereas movement along the same length is opposed.⁴² As a
 result nothing prevents there being a continuous movement that ceases for no
 time. For movement in a circle is from a point itself to itself, while movement in
 b20 a straight line is from the point itself to another one. And movement in a circle
 is never in the same places, whereas that in a straight line ⟨and back⟩ is many
 times in the same places.

Now then, it is possible to be moved continuously with the movement that
 always comes to be in different places, but not with that which comes to be
 many times in the same places, since it is ⟨in that case⟩ necessary to be moved
 b25 with opposed movements. As a result, neither in a semicircle nor on any other
 ⟨part of a⟩ circumference at all is it possible to be moved continuously. For
 it is necessary to be moved many times in respect of the same places, and to
 undergo opposite changes, since the limit does not join up with the beginning.
 But movement belonging to a circle joins up, and is alone complete.

⁴¹ See the *Note* on *πρόθεσιν* (264b11, p. 276).

⁴² Sc. in any case, if it is in the opposite direction, but not between contrary extremes: see
 further the *Note* on 264b13–17 (pp. 276–277).

And it is obvious from this distinction that the other kinds of movement cannot be continuous either. For in all of them it turns out that there is movement many times in respect of the same things, such as in alteration in respect of what is in between, and in change of size in respect of the intermediate magnitudes, and in generation and destruction similarly. For it makes no difference whether we make those things through which change occurs few or many, nor whether we place something in between or remove it, since in either case it turns out that there is movement many times in respect of the same things.⁴³

So it is clear from this that those who account for nature by declaring that all perceptible things are always in movement do not in fact give a fine account. For things must be in movement in respect of one of these movements, and according to them they must be in alteration; for they say that they are always flowing and wasting away, and furthermore they call generation and destruction alteration. But the present account has stated generally about all movement that it is not possible to be moved continuously in respect of any movement except that in a circle, so that it is not possible in respect of alteration nor of growth. So let us take this much to have been established by us, that no change is either limitless or continuous except transportation in a circle.

It is clear that transportation in a circle is the first form of transportation. For every form of transportation, as we stated previously,⁴⁴ is either in a circle or on a straight line, or mixed. But the former kinds must be prior to the latter, for it is constituted from them. And that in a circle is prior to that on a straight line, for it is, by contrast, simple and complete. For on the one hand, it is not possible to be transported in an infinite straight line, for there cannot be what is infinite in this sense; and it is jointly true that even if there could be, nothing could be moved (over an infinite straight line), for what is impossible does not come to be, and it is impossible to traverse an infinite (line). And on the other hand, a movement that turns back on a finite straight line is composite and two movements, while if it doesn't turn back it is incomplete and impermanent. But what is complete is prior in nature, in account and in time to the incomplete, and the permanent is prior to the impermanent.

43 There will in any case be *some* intermediates, since any movement is internally continuous and divisible; it all depends how we divide it in practice as to what they are, but even so it makes no difference to the general principle that in every case except circular transportation the body returns by way of the same intermediates, and so at each extreme must stop (cf. Graham, 1999, p. 155).

44 *Ph.* 8.8, 261b28–29; and, with 265a15–16 here, cf. 261b29–31.

Furthermore a movement which can be everlasting is prior to one which
 a25 cannot be so. Then movement in a circle can be everlasting, but none of the
 others, neither transportation nor any other movement, can; for ⟨in each of
 those cases⟩ there must be a stoppage, and if there is a stoppage, the movement
 has ceased.

And it is quite reasonable that it has turned out that movement in a circle is
 a30 one and continuous, and not that on a straight line. For the beginning, the end
 and the middle of movement on a straight line are defined, and the movement
 contains all of them within itself. As a result, there is a point from which what
 is moved will begin, and a point where it will end (for everything rests at the
 limits, either at the point from which it begins, or at which it ends), but these
 are undefined for circular movement. For why is any point at all on the line
 more a limit than any other? For each is equally a beginning, a middle and an
 265b1 end, so that ⟨what is moved⟩ is both always at the beginning and at the end,
 and never there.⁴⁵

For this reason a sphere is in a way both in movement and at rest; for it
 ⟨always⟩ occupies the same place. What is responsible is that each of these
 ⟨boundaries⟩ coincides with the centre. For that is the beginning, the middle
 b5 and the end of the magnitude, so that because of this point being external to the
 perimeter, there is nowhere for what is transported to rest having completed
 its movement (for it is always transported around the middle, and not to the
 extreme point), and because this remains, in a sense the whole is both at rest
 and continuously in movement.

And the cases turn out to correspond. For in fact because rotation is the
 b10 measure of movements, it must be primary (for everything is measured by what
 is primary), and because it is primary, it is the measure of the others.

But furthermore only movement in a circle can be even. For things on a
 straight line are transported unevenly from the beginning and to the end,
 for everything is transported ⟨by nature⟩ faster the further it departs from
 b15 ⟨unnatural⟩ rest, but there is no natural beginning or end within itself of
 movement in a circle, and instead it is external.

All those who have made mention of movement bear witness that trans-
 portation in place is the first of movements. For they attribute the beginnings
 of it to those things that incite this kind of movement. For separation and
 b20 blending are movements in place, and love and strife incite movement like
 this.⁴⁶ For the one separates and the other of them blends. And Anaxagoras

45 See the *Note* on 265a34–b1 (p. 293).

46 This refers to Empedocles' doctrine; see *Note* on 265b20–21 (p. 299).

says that in fact the intellect that first incited movement separates things. And similarly also all those who deny there is any such responsibility, and assert that there is movement because of the void.⁴⁷ For in fact they say that nature is moved with movement in place (for movement because of the void is transportation and, as it were, in place), and they think that none of the other forms of movement belong to the first principles, but only to what arises from them. For they assert that when the indivisible bodies blend and separate, things grow and shrink and are altered. b25

All those too who arrange generation and destruction by condensation and rarefaction speak in the same way.⁴⁸ For they organise this by blending and separating. And furthermore besides these those who make the soul responsible for movement do so.⁴⁹ For they say that what moves itself is the principle of things being moved, and an animal and everything ensouled moves itself with movement in place. 266a1

And we say that only what is moved in place is moved in the authoritative sense; but if it rests in the same place, and grows or shrinks or happens to alter, we say it is moved in a way, but not simply moved. a5

So it has been established that there always was and will be movement throughout all time, and what the principle of everlasting movement is, and further what the first movement is, and what movement can alone be everlasting, and that what first incites movement is unmoved.

We should now establish that the latter (i.e. what first incites movement) must be without parts and have no magnitude, determining first those points that are prior to this. One of these is that nothing limited can incite movement for an unlimited time. For there are three factors, what incites movement, what is moved, and third, that in which, the time. And these are either all unlimited, or all limited, or some are, such as the (first) two, or the (first) one. Now let A be what incites movement, B what is moved, and unlimited time be that to which C applies. Now let D move some part of the line B, to which E applies. It does not move it (to the same extent) in a time equal to C, for it moves what is larger in a greater time. As a result the time, called F, is not unlimited. Now adding to D, I will use up A, and to E, B. But I will not use up the time (C) by always removing an equal part, for the time is unlimited. As a result, the whole line A will move the whole line B in a time that is a limited part of C. Thus it is not possible for 10, 266a10
a15
a20

47 The atomists; see the *Note* on 265b23–24 (p. 299).

48 Anaximenes and possibly others; see the *Note* on 265b30–31 (p. 299).

49 Plato and his followers; see the *Note* on 265b32–33 (p. 300).

something to be moved with an unlimited movement by something limited. So it is obvious that it is not possible for what is limited to incite movement for an unlimited time.

a25 But that it is not possible overall for there to be an unlimited power in a limited magnitude is clear from the following. For let the greater power be that which always does an equal amount in a lesser time, such as heating or sweetening or throwing or in general inciting movement. It is thus necessary that what is affected is affected also by what is limited but has an unlimited
a30 power, and more than by something else. For the unlimited power is greater (than any other). But it is not possible for this to take any time. For if there is a time, to which A applies, in which an unlimited strength heated or pushed (something to a given extent), but in AB a limited strength did so, by always
266b1 taking a greater limited strength in addition to this, I will eventually come to its having incited the movement in A. For by always adding to something limited I will exceed any bounded quantity, and by removing I will in the same way make it less than any. Thus in an equal time to that in which the unlimited strength did so, a limited one will incite (the same) movement. But this is impossible;
b5 thus nothing limited can contain an unlimited power.

Moreover neither can there be a limited power in an unlimited magnitude. (Now indeed there can be a greater power in a smaller magnitude (of one kind of body than of another), although all the more there can be a greater one in a larger magnitude (of the same kind).)

Now let the magnitude to which AB applies be unlimited. Now the magni-
b10 tude BC has a certain power, which moves the line D (to a given extent) in a certain time, that to which EF applies.⁵⁰ Now if I take double the line BC, it moves D (to the same extent) in half the time EF (for let this be the proportionality), so that it moves it in FG. Then by always taking (a greater multiple of BC) I will never go right through AB, and I will always take a lesser part of
b15 the given time. Thus the power (of AB) will be unlimited. For it exceeds any limited power, assuming that the time any limited power takes must be limited (for if this great a power moves it in a certain time, a greater power will do so in a lesser but bounded time, in accordance with the inverse proportionality (of the ratio between power and time)). But every power is unlimited, just like
b20 every multitude and magnitude, that exceeds every bounded one.

It is possible to demonstrate this as follows too: for we will take a certain power that is the same in kind as the power in an unlimited magnitude, a power in a limited magnitude, so that it will measure off the limited power in what

50 BC is a part of AB, and therefore finite, and thus the time EF is also finite.

is unlimited. So from this it is clear that it is not possible for there to be an unlimited power in a limited magnitude, nor a limited power in an unlimited magnitude. b25

But concerning things that are transported, it is well first to solve a certain difficulty. For if everything moved is moved by something, in the case of all those that do not move themselves, how are some moved continuously, if what incites movement is not in contact with them, such as things that are thrown? But if someone who incites movement at the same time also moves something else, such as the air, which incites movement by being moved, nevertheless it is impossible for that to be moved if what is first neither is in contact nor incites movement; rather everything ⟨must⟩ both be in movement and have stopped when what first incites movement stops doing so, even if it makes what it moves capable of inciting movement, like a stone can. b30 267a1

Now we must say this, that what first incited movement makes either the air or the water or something other of this kind, that naturally incites movement and is moved, able to incite movement. But it does not stop inciting movement and being moved together; rather, it stops being moved together with the person inciting movement stopping inciting movement, but it is still something inciting movement. Because of this, it actually moves something else adjacent; and in the case of this the account is the same. But this is coming to a stop when in each case the power of inciting movement comes to be less in what is adjacent. And it stops finally when what is prior in the series no longer makes what it acts on into something that incites movement, but only something in movement. And these, the one inciting movement and the other being moved, must stop together, along with the whole movement. So this movement comes to be in those things that are capable of being moved at one time and being at rest at another, and it is not continuous, although it appears so. For it is either a movement of things in series or in contact; for what incites movement is not one, but things adjacent to one another. a5 a10 a15

For this reason this kind of movement, which some people call re-encycling,⁵¹ happens in the air and in water. But it is impossible to solve the puzzles otherwise, except in the way that has been stated. Re-encycling causes everything to be moved and incite movement together, so that they also stop together; but, as it is, it seems to be some one thing in continuous movement; then what is it moved by? ⟨But it isn't in continuous movement⟩, for it is not moved by the same thing. a20

51 ἀντιπερίστασις (*antiperistasis*): see the Note on Premiss *c.i* and 267a16–17 (p. 341).

Since there must be continuous movement among the things there are, and this movement is one, and the one movement must be that of some magnitude (for what lacks magnitude is not moved), and the movement of one magnitude and caused by one thing (for otherwise it will not be continuous, but (in each instance) a different movement adjacent to and distinct from another), well
 a25 then, what incites movement, if it is one, either incites movement while itself in movement, or being unmoved. Now if it incites movement while in movement, it will have to accompany what it moves and itself change, and together with
 267b1 what it moves it will be moved by something; consequently (this causal chain) will stop (at some point), that is to say, it will come to movement caused by something unmoved. For this need not change with what it moves, but it will always be able to incite movement (since inciting movement like this is effortless), ...

... and this movement is alone or most of all uniform, for what incites it
 b5 undergoes no change. And what is moved must undergo no change in relation to that, so that its movement is regular. Now it⁵² must be either in the middle or on the circle, for these are the principles. But the parts nearest what incites movement are moved fastest, and the movement of the circle is like that. Thus what incites movement (acts) there.

But there is a difficulty whether something moved can incite movement
 b10 continuously, and not, like what pushes again and again, cause it continuously by serial means. For either that thing itself must always push or pull or both, or one thing taking over from another must, as was previously stated in the case of things thrown, if the air is divisible and the various parts, which are
 b15 themselves moved, each incite movement. But in either case the movement cannot be one, but is one adjacent to another. Thus the only continuous movement is that which what is unmoved incites; for being always in a similar condition it will also be in a similar and continuous relationship to what is moved.

Now that these things have been determined, it is obvious that it is impos-
 sible that what first incites movement and is unmoved should have any mag-
 b20 nitude. For if it has magnitude, it must either be limited or unlimited. Now it has been demonstrated previously in the works on nature that there cannot be an unlimited magnitude; and it has been demonstrated now that what is limited cannot have an unlimited power, and that something cannot be moved by what is limited for an unlimited time. But indeed what first incites movement

52 I.e., what is first moved: see the previous sentence, the *Commentary* on this passage (pp. 346–348), and the *Note* on 267b6–7 (p. 349).

incites an everlasting movement, that is to say, for unlimited time. Well then, it b25
is obvious that it is indivisible and without parts and something with no magnitude.

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(B) The possibility of no movement at sometime (250b23–251a5; pp. 21–22)

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